



Mr. John Miller  
U.S. Army Corps of Engineers, NWO  
Attn: CENWO-PM-HA  
1616 Capitol Avenue  
Omaha, NE 68102-1620

May 18, 2011

J. O. No 116188.17705000

**FINAL SITE-SPECIFIC WORK PLAN  
FORT DES MOINES  
FUDS PROPERTY NO. B07IA0729  
DELIVERY ORDER NO. 003, CONTRACT NO. W912 DY-04-D-0010**

Dear Mr. Miller:

Enclosed is the Final Site-Specific Work Plan (SSWP) for Fort Des Moines. We are issuing paper and CD copies as indicated below, consistent with our PWS. Responses to comments on the Draft SSWP were sent separately via email.

Based on our responses to comments on the Draft SSWP, we are assuming that the SSWP is approved as submitted. If there are any questions, please contact me at 720-554-8178.

Sincerely,

Peter Kelsall  
Project Manager

Enclosures:

Hard Copy Appendices are on CD.  
CD contains the full document



cc: USACE Omaha Design Center  
CEHNC-EMM  
EM Center of Expertise  
Iowa Dept. of Natural Resources  
City of Des Moines  
Polk County Conservation Board  
USEPA

Mr. John Miller  
Ms. Deb Walker  
Document Distribution  
Mr. Dan Cook  
Mr. David McGuffin  
Mr. Loren Lown  
Mr. Ron King

1 paper, 1 CD  
1 paper, 2 CDs  
1 CD  
1 paper, 1 CD  
1 paper, 1 CD  
1 paper, 1 CD  
1 paper, 1 CD

F27249.doc



**US Army Corps  
of Engineers®**  
Omaha District

---

**Final Site-Specific Work Plan  
Fort Des Moines  
FUDS Property No. B07IA0729  
Polk County, Iowa**

**Site Inspections at Multiple Sites, NWO Region  
Formerly Used Defense Sites  
Military Munitions Response Program**

**Contract No. W912DY-04-D-0010  
Delivery Order No. 003**

**May 2011**



7604 Technology Way, Suite 300  
Denver, CO 80237

**FINAL  
SITE-SPECIFIC WORK PLAN**

**FORT DES MOINES**  
FUDS Property No. B07IA0729  
Polk County, Iowa

Site Inspections at Multiple Sites, NWO Region  
Formerly Used Defense Sites  
Military Munitions Response Program

Submitted to:

U.S. Department of the Army  
U.S. Army Corps of Engineers, Omaha District

Prepared by:

Shaw Environmental, Inc.  
7604 Technology Way, Suite 300  
Denver, CO 80237

Contract No. W912DY-04-D-0010  
Delivery Order No. 003

May 2011

## Table of Contents

---

|   |     |
|---|-----|
| List of Figures .....   | iii |
| List of Tables.....   | iii |
| List of Appendices .....  | iii |
| List of Acronyms and Abbreviations .....  | iv  |
| <br>  |     |
| 1.0 Introduction.....   | 1   |
| 1.1 Project Authorization .....   | 1   |
| 1.2 Site Name and Location .....  | 2   |
| 1.3 MRS Inventory.....  | 2   |
| 1.4 Scope and Objectives.....   | 3   |
| 1.5 Site Inspection Process .....   | 4   |
| 1.6 Munitions Response Site Prioritization Protocol .....                       | 4   |
| 1.7 Decision Rules.....   | 5   |
| 1.8 MEC Technical Approach .....  | 6   |
| 1.9 SSWP Organization.....  | 7   |
| 2.0 Site Information .....  | 9   |
| 2.1 Property Description and History .....                                      | 9   |
| 2.1.1 Historical Military Use .....   | 10  |
| 2.1.2 Munitions Information .....   | 10  |
| 2.1.3 Ownership History .....   | 10  |
| 2.2 Physical Setting .....  | 11  |
| 2.2.1 Topography and Vegetation .....   | 11  |
| 2.2.2 Surface Water .....   | 11  |
| 2.2.3 Sensitive Environments .....  | 12  |
| 2.2.4 Climate .....   | 14  |
| 2.2.5 Geologic and Hydrogeologic Setting .....                                  | 14  |
| 2.2.5.1 Bedrock Geology .....   | 14  |
| 2.2.5.2 Overburden Soils.....   | 14  |
| 2.2.5.3 Hydrogeology .....  | 15  |
| 2.3 Population and Land Use .....   | 15  |
| 2.3.1 Nearby Population .....   | 15  |
| 2.3.2 Land Use .....  | 16  |
| 2.3.3 Area Water Supply .....   | 16  |
| 2.3.4 Access.....   | 17  |
| 2.4 TPP Summary .....   | 17  |
| 2.5 Summary of Previous Investigations .....                                    | 18  |
| 2.5.1 Archives Search Report (ESE, 1985) .....                                  | 18  |
| 2.5.2 Inventory Project Report (USACE, 1992) .....                              | 18  |
| 2.5.3 ASR Supplement (USACE, 2004b) .....                                       | 18  |
| 2.5.4 Archives Search Report (USACE, 2006a) .....                               | 18  |
| 2.5.5 Site Specific CWM Scoping and Security Study Report (Parsons, 2006) ..... | 19  |
| 2.5.6 Inventory Project Report (USACE, 2010) .....                              | 19  |
| 2.6 Other Land Uses that May Have Contributed to Contamination .....            | 20  |

## Table of Contents (Cont.)

---

|         |  |    |
|---------|--|----|
| 2.7     | Preliminary Conceptual Site Model Summary .....            | 20 |
| 3.0     | Pre-Field Activities .....                                 | 21 |
| 3.1     | Coordination with State Historic Preservation Office ..... | 21 |
| 3.2     | Coordination Regarding Natural Resources .....             | 21 |
| 3.3     | Review of Historical Aerial Photographs .....              | 22 |
| 3.4     | Coordination of Rights-of-Entry .....                      | 22 |
| 3.5     | Equipment .....  | 22 |
| 3.6     | Communications .....                                       | 22 |
| 3.7     | Training and Briefing .....                                | 22 |
| 4.0     | Site Inspection Activities .....                           | 24 |
| 4.1     | Key Personnel .....  | 24 |
| 4.2     | Field Reconnaissance .....                                 | 25 |
| 4.2.1   | Objectives .....   | 25 |
| 4.2.1.1 | Document General Site Conditions .....                     | 26 |
| 4.2.1.2 | Document Evidence of Military Activities .....             | 26 |
| 4.2.1.3 | Sample Locations .....                                     | 27 |
| 4.2.2   | Reconnaissance Methods .....                               | 27 |
| 4.2.3   | Extent of Reconnaissance .....                             | 28 |
| 4.3     | Field Sampling .....                                       | 28 |
| 4.3.1   | MRS Samples .....  | 29 |
| 4.3.1.1 | Surface Soil Sampling .....                                | 29 |
| 4.3.1.2 | Sediment and Surface Water Sampling .....                  | 29 |
| 4.3.2   | Background Sampling .....                                  | 30 |
| 4.3.3   | Quality Assurance/Quality Control Samples .....            | 30 |
| 4.3.4   | Sample Preservation, Packaging, and Shipping .....         | 30 |
| 4.4     | Analytical Program .....                                   | 31 |
| 4.5     | Background and Screening Values .....                      | 32 |
| 4.6     | Site-Specific Information/Data .....                       | 33 |
| 5.0     | Investigation-Derived Waste .....                          | 35 |
| 6.0     | Proposed Schedule .....                                    | 36 |
| 7.0     | References .....   | 37 |

## *List of Figures*

---

|           |   |
|-----------|---|
| Figure 1  | Site Location   |
| Figure 2  | 1967 Aerial Photograph                                  |
| Figure 3  | 2010 Aerial Photograph                                  |
| Figure 4  | Parcel Ownership  |
| Figure 5  | Topographic Map   |
| Figure 6  | Regional Surface Water Drainage within a 15-Mile Radius |
| Figure 7  | Census Data within a 4-Mile Radius                      |
| Figure 8  | Sensitive Receptor Locations within a 4-Mile Radius     |
| Figure 9  | Groundwater Well Locations within a 4-Mile Radius       |
| Figure 10 | Proposed Sample Locations                               |

## *List of Tables*

---

|         |  |
|---------|--|
| Table 1 | Munitions Information  |
| Table 2 | Sample Location Rationale  |
| Table 3 | Sample Designations, Quality Assurance/Quality Control, and Analyses |
| Table 4 | Human Health Screening Criteria for Soil and Sediment                |
| Table 5 | Human Health Screening Criteria for Surface Water                    |
| Table 6 | Ecological Screening Criteria for Soil                               |
| Table 7 | Ecological Screening Criteria for Sediment                           |
| Table 8 | Ecological Screening Criteria for Surface Water                      |

## *List of Appendices*

---

|            |  |
|------------|--|
| Appendix A | Conceptual Site Model  |
| Appendix B | USACE Interim Guidance Document 06-05 and Safety Advisory 06-2 |
| Appendix C | Site Safety and Health Plan Addendum                           |
| Appendix D | Standard Operating Procedures                                  |

## *List of Acronyms and Abbreviations*

---

|                     |   |
|---------------------|---|
| °F                  | degrees Fahrenheit  |
| AMSL                | above mean sea level  |
| ASR                 | <i>Archives Search Report</i>   |
| ASTM                | ASTM International  |
| bgs                 | below ground surface  |
| CAIS                | chemical agent identification sets                                    |
| CERCLA              | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR                 | Code of Federal Regulations   |
| CSM                 | conceptual site model   |
| CWM                 | chemical warfare materiel   |
| DERP                | Defense Environmental Restoration Program                             |
| DMM                 | discarded military munitions  |
| DMWW                | Des Moines Water Works  |
| DoD                 | Department of Defense   |
| DQO                 | data quality objective  |
| Eco SSL             | Ecological Soil Screening Level                                       |
| EDR                 | Environmental Data Resources, Inc.                                    |
| EM                  | Engineer Manual   |
| EOD                 | Explosives Ordnance Disposal  |
| EPA                 | U.S. Environmental Protection Agency                                  |
| ER                  | Engineer Regulation   |
| ESE                 | Environmental Science and Engineering, Inc.                           |
| ESL                 | Ecological Screening Level  |
| ESV                 | ecological screening values   |
| FSP                 | Field Sampling Plan   |
| ft                  | foot or feet  |
| FUDS                | Formerly Used Defense Site  |
| GPS                 | global positioning system   |
| HAZWOPER            | Hazardous Waste Operations and Emergency Response                     |
| HRS                 | Hazard Ranking System   |
| IDNR                | Iowa Department of Natural Resources                                  |
| IDW                 | investigation-derived waste   |
| IEP                 | important ecological place  |
| INPR                | <i>Inventory Project Report</i>                                       |
| LANL                | Los Alamos National Laboratory  |
| m <sup>3</sup> /sec | cubic meters per second   |
| MC                  | munitions constituents  |
| MD                  | munitions debris  |
| MEC                 | munitions and explosives of concern                                   |
| MMRP                | Military Munitions Response Program                                   |
| MRA                 | munitions response area   |
| MRS                 | munitions response site   |
| MRSP                | Munitions Response Site Prioritization Protocol                       |

## *List of Acronyms and Abbreviations (Continued)*

---

|           |  |
|-----------|--|
| NAD       | North American Datum   |
| NCP       | National Oil and Hazardous Substances Pollution Contingency Plan |
| NDAI      | No Department of Defense Action Indicated                        |
| NRHP      | National Register of Historic Places                             |
| NWO       | Northwestern Division Omaha District                             |
| ORNL      | Oak Ridge National Laboratory                                    |
| PRG       | Preliminary Remediation Goal                                     |
| QA/QC     | Quality Assurance/Quality Control                                |
| QAPP      | Quality Assurance Project Plan                                   |
| RCWM      | recovered chemical warfare materiel                              |
| RI/FS     | Remedial Investigation/Feasibility Study                         |
| ROE       | right-of-entry   |
| RSL       | Regional Screening Level   |
| SAP       | Sampling and Analysis Plan                                       |
| Shaw      | Shaw Environmental, Inc.   |
| SI        | Site Inspection  |
| SOP       | Standard Operating Procedure                                     |
| SSHP      | Site Safety and Health Plan                                      |
| SSWP      | Site-Specific Work Plan  |
| TPP       | Technical Project Planning                                       |
| U.S.      | United States  |
| USACE     | U.S. Army Corps of Engineers                                     |
| USAESCH   | USACE Engineering and Support Center, Huntsville                 |
| USC       | United States Code   |
| USDA      | U.S. Department of Agriculture                                   |
| USFWS     | U.S. Fish and Wildlife Service                                   |
| USGS      | United States Geological Survey                                  |
| UTM       | Universal Transverse Mercator                                    |
| UXO       | unexploded ordnance  |
| WAA       | War Assets Administration  |
| Work Plan | <i>Final Type I Work Plan</i>                                    |
| yd        | yard(s)  |

## 1.0 Introduction

---

This Site-Specific Work Plan (SSWP) presents the information necessary to conduct field activities associated with a Site Inspection (SI) planned at the Fort Des Moines Pistol Range Munitions Response Site (MRS). The SI field activities will consist of site reconnaissance for munitions and explosives of concern (MEC) and sampling and analysis of soil, sediment, and surface water for munitions constituents (MC).

MEC are military munitions that may pose unique explosives safety risks, such as unexploded ordnance (UXO), discarded military munitions (DMM), or MC present in high enough concentrations to pose an explosive hazard. MC are any materials originating from UXO, DMM, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S. Code [USC] 2710(e)(3) and 10 USC 2710(e)(2)).

### 1.1 Project Authorization

The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) to address DoD sites suspected of containing MEC or MC. Under the MMRP, the U.S. Army Corps of Engineers (USACE) is conducting environmental response activities at Formerly Used Defense Sites (FUDS) for the Army, the DoD Executive Agent for the FUDS program.

Pursuant to USACE Engineer Regulation (ER) 200-3-1 (USACE, 2004a) and the *Management Guidance for the Defense Environmental Restoration Program* (DERP) (Office of the Deputy Under Secretary of Defense [Installations and Environment], September 2001), USACE is conducting FUDS response activities in accordance with the DERP statute (10 USC 2701 et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC 9601), Executive Orders 12580 and 13016, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] Part 300). As such, USACE is conducting remedial SIs, as set forth in the NCP, to evaluate hazardous substance releases or threatened releases from eligible FUDS.

While not all MEC/MC constitute CERCLA hazardous substances, pollutants, or contaminants, the DERP statute provides DoD the authority to respond to releases of MEC and MC, and DoD policy states that such responses shall be conducted in accordance with CERCLA and the NCP.

Shaw Environmental, Inc. (Shaw) is responsible for conducting SIs at FUDS in the northwest region managed by the USACE Northwestern Division Omaha District (NWO) Military Munitions Design Center. Shaw has prepared this SSWP for the USACE, under USACE Contract No. W912DY-04-D-0010, as a supplement to the *Final Type I Work Plan* (Work Plan; Shaw, 2006).

## 1.2 Site Name and Location

Fort Des Moines, FUDS property number B07IA0729, is located in Polk County, Iowa, approximately 5 miles south of the central business district of Des Moines (Figure 1). The FUDS is situated south of Army Post Road and bordered by SW 9<sup>th</sup> Street to the west, SE 5<sup>th</sup> Street to the east, and NW 98<sup>th</sup> Avenue (County Line Road) to the south. The FUDS includes 640 acres in Township 78 North, Range 24 West, Sections 33 and 34. The former Pistol Range MRS is located in Section 34.

## 1.3 MRS Inventory

Fort Des Moines is included in the MRS Inventory in the *Defense Environmental Programs Annual Report to Congress Fiscal Year 2009* (DoD, 2009), under Federal Facility Identification number IA79799F022800. Some information provided in the 2009 MRS Inventory has been superseded by revisions made in June 2010 to the *Inventory Project Report* (INPR).

In June 2010, the USACE revised the original INPR completed in 1992. The revised INPR proposed administrative changes to divide the original MMRP/Chemical Warfare Materiel (CWM) project (B07IA072903) into two separate projects in accordance with definitions of munitions response areas (MRAs) and MRSs as mandated by DoD and by guidance provided by USACE Headquarters (USACE, 2010). Information provided in the revised INPR for the Pistol Range MRS is shown below:

| Project No. | Project Name | MRS No. | MRS Name     | MEC     | MC      | MRSPP         | Acres |
|-------------|--------------|---------|--------------|---------|---------|---------------|-------|
| 04          | Pistol Range | TBD     | Pistol Range | Unknown | Unknown | Not evaluated | 0.43  |

The *Archives Search Report* (ASR) (Environmental Science and Engineering [ESE], 1985 and USACE, 2006a) and *ASR Supplement* (USACE, 2004b) depict the Pistol Range MRS as currently underlying a pond located within the Fort Des Moines Park and as an approximately 20-acre area (inclusive of the safety fan) with a firing direction to the southeast. After reviewing historical aerial photographs, a 2008 city planning study (City of Des Moines, 2008), and verifying with a retired county park employee, the MRS location was revised. The correct location of the MRS is approximately 500 feet (ft) to the east-northeast of the location represented in the ASR and the *ASR Supplement*. A 1967 aerial photograph shows the correct location of the MRS. An earthen salvage wall and target areas are both visible on the photograph (Figure 2). The direction of fire at the small arms range was to the northwest, which is the reverse direction of the small arms range indicated in the *ASR Supplement*. The revised MRS shown on Figure 2 occupies approximately 1.3 acres. Because of the height of the earthen salvage wall, a safety fan has not been included. Figure 3 shows the location of the MRS on a recent (2010) aerial photograph.

## 1.4 *Scope and Objectives*

The primary objective of the MMRP SI is to determine whether or not a FUDS project warrants further response action under CERCLA. The SI collects the minimum amount of information necessary to make this determination, as well as it (i) determines the potential need for a removal action; (ii) collects or develops additional data, as appropriate, for Hazard Ranking System (HRS) scoring by the U.S. Environmental Protection Agency (EPA); and (iii) collects data, as appropriate, to characterize the release for effective and rapid initiation of the Remedial Investigation and Feasibility Study (RI/FS). An additional objective of the MMRP SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSP).

The scope of the SI reported herein is restricted to evaluation of the presence of MEC or MC related to historical use of the FUDS prior to transfer. Potential releases of hazardous, toxic, or radioactive wastes are not addressed within the current scope. The intent of the SI is to confirm the presence or absence of contamination from MEC and/or MC. The general approach for each SI is to conduct a records review and site reconnaissance in order to evaluate the presence or absence of MEC and to collect samples at locations where MC might be expected based on the conceptual site model (CSM) (Appendix A). The following decision rules are used to evaluate the results of the SI:

- Is No DoD Action Indicated (NDAI)? An NDAI recommendation may be made if:
  - There is no indication of MEC; and
  - MC contamination does not exceed screening levels determined from Technical Project Planning (TPP).
- Is an RI/FS warranted? An RI/FS may be recommended if:
  - There is evidence of MEC hazard. MEC hazard may be indicated by direct observation of MEC during the SI, by indirect evidence (e.g., a crater potentially caused by impact of UXO), or by a report of MEC being found in the past without record that the area was subsequently cleared; or
  - MC contamination exceeds screening levels determined from TPP.
- Is a removal action warranted? A removal action may be needed if:
  - High MEC hazard is identified. Shaw will immediately report any MEC findings so that USACE can determine the hazard in accordance with the MRSP. An example of a high hazard would be finding sensitive MEC at the surface in a populated area with no barriers to restrict access; or
  - Elevated MC risk is identified. Identification of a complete exposure pathway (e.g., confirming MC concentrations above health-based risk standards in a water supply well) would trigger notification of affected stakeholders. Data would be presented at a second TPP meeting regarding the possible need for a removal action.

For purposes of applying these decision rules, USACE has provided guidance that evidence of MEC will generally be a basis of recommending RI/FS. Evidence of MEC may include confirmed presence of MEC from historical sources or SI field work, or presence of munitions debris (MD).

### ***1.5 Site Inspection Process***

The steps involved in conducting an SI include:

- Reviewing existing data,
- Following the TPP process,
- Preparing the SSWP,
- Conducting the SI field activities (site reconnaissance, media sampling, and analysis), and
- Preparing the SI Report.

The TPP process is one through which project objectives and data collection processes are identified, and site stakeholders are brought together to discuss goals and objectives. This process includes the following phases:

- Identification of the current project area,
- Determination of data needs,
- Development of data collection options, and
- Finalization of the data collection program.

A multi-disciplinary team of key stakeholders attended a TPP meeting(s) in order to participate in the process so SI activities can be conducted in a timely and efficient manner.

### ***1.6 Munitions Response Site Prioritization Protocol***

The DoD is required to assign a relative priority for each MRS within a (MRA). This process is to be completed for all DoD sites including FUDS, which are known or suspected of containing UXO, DMM, or MC.

Definitions:

*Defense Sites* – Locations that are or were owned by, leased to, or otherwise possessed or used by the DoD. The term does not include any operational range, operating storage, or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions (10 USC 2710(e)(1)).

*Munitions Response Area* – An MRA refers to any area on a Defense Site that is known or suspected to contain UXO, DMM, or MC. Examples are former ranges and munitions burial areas. An MRA can be comprised of one or more MRS (32 CFR 179.3).

*Munitions Response Site* – A discrete location within an MRA that is known to require a munitions response (e.g., remedial response) (32 CFR 179.3). MRSPP scoring is completed for each MRS.

## 1.7 Decision Rules

The following proposed data quality objectives (DQOs) and decision rules will guide the technical approach at various stages of the SI as the specific MRS is evaluated:

### **Objective 1: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MEC.**

DQO No. 1 – Using trained UXO personnel and a handheld magnetometer and an all-metal detector, visual surface reconnaissance of the MRS will be conducted for physical evidence indicating the presence of MEC. The following decision rules will apply:

- If evidence of MEC is not found (other than MEC associated with small arms), the MRS will be recommended for NDAI relative to MEC.
- If evidence of MEC (other than small arms) is discovered and suspected to be hazardous, the MRS will be recommended for additional investigation.
- If there is indication of an imminent MEC hazard, the site may be recommended for a removal action.

For purposes of applying these rules, small arms ammunition is not considered to present a significant MEC hazard.

### **Objective 2: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MC above screening values.**

DQO No. 2 – Samples (surface soil, sediment, and surface water, if available) will be collected and analyzed. Analytical results will be compared to screening values for human health and ecological risk assessment and to background values for naturally occurring substances. The following decision rules will apply:

- If sample results do not exceed background, the site will be recommended for NDAI relative to MC.
- If sample results exceed background but are less than human health and ecological screening values, additional evaluation of the data will be conducted with the stakeholders to determine whether additional investigation would be warranted.
- If sample results exceed both human health screening levels and background values, the site will be recommended for additional investigation.
- If sample results do not exceed human health screening levels but do exceed both ecological screening values and background values, additional evaluation of the data will be conducted with the stakeholders to determine whether additional investigation would be warranted.

### **Objective 3: Obtain data required for HRS scoring.**

Data required for HRS scoring are identified in the HRS Data Gaps worksheet in the *Final TPP Memorandum* (Shaw, 2011).

#### **Objective 4: Obtain data required for MRSP ranking.**

Data required for MRSP ranking are identified in the MRSP worksheet in the *Final TPP Memorandum* (Shaw, 2011).

#### **1.8 MEC Technical Approach**

The technical approach is based on the Work Plan (Shaw, 2006), *Final Technical Project Planning Memorandum* (Shaw, 2011), and the *Formerly Used Defense Sites, Military Munitions Response Program, Site Inspections, Program Management Plan* (USACE, 2005). In accordance with Section 3.1.1 of the Work Plan, the technical approach includes the following:

- Existing data will be used to document the presence or absence of MEC.
- A magnetometer and/or all-metal detector assisted site reconnaissance will supplement the existing data in an attempt to identify evidence of MEC and/or MD at the ground surface, under vegetative cover, or beneath the surface.

If MEC or potential MEC involving conventional munitions is found during SI field activities, the Shaw field team leader shall make notifications consistent with Interim Guidance Document 06-05 and Safety Advisory 06-2 (Appendix B).

The Shaw field team leader is responsible for making the following notifications to the following parties as soon as possible within the constraints of site conditions and available means of communication:

- Notify the property owner or individual granting right-of-entry (ROE) to the property of the hazard, advising the individual to call the local emergency response authority (e.g., police or sheriff). Inform the individual that if they do not call the local response authority within one hour, the Shaw field team leader will notify the local emergency response authority.
- Notify the Shaw Project Manager. The Shaw Deputy Project Manager or other designated Shaw management representative identified during the task kick-off meeting may be contacted if direct contact is not made with the Shaw Project Manager. If direct contact is not made with any Shaw management representative, then the Shaw field team leader is responsible for making additional notifications on behalf of the Shaw Project Manager, as described below.

For purposes of notifying a Shaw management representative, direct contact consists of person-to-person communication by telephone or other means, such as email to which the contacted party has acknowledged receipt of the message. The local emergency response authority will decide how to respond to the reported incident (e.g., requesting an Explosive Ordnance Disposal [EOD] unit or local bomb squad response, or deciding not to respond). The Shaw field team shall not leave the vicinity of the known or potential MEC find, except as necessary to make required notifications (e.g., to meet a property owner who cannot be reached

by telephone), until directed to leave by the local emergency response authority, EOD team, property owner, or Shaw management representative.

The Shaw Project Manager or other Shaw management representative is responsible for making the following notifications in a prompt manner via simultaneous email:

- USACE District Project Manager,
- USACE Design Center Project Manager,
- USACE Design Center Safety Office (Chris Bryant), and
- USACE EM CX Management (Deborah Walker and Dwayne Ford).

Although it is not anticipated that recovered chemical warfare materiel (RCWM) or chemical agent identification sets (CAIS) will be encountered at this site, if known or potential RCWM or CAIS is encountered, the Shaw field team leader shall withdraw upwind from the find and make the following notifications:

- Local emergency response authority (immediate contact);
- USACE Chemical Warfare Design Center (immediate contact), using 24/7 hotline at 256-895-1180 (email: [Wilson.C.Walters@usace.army.mil](mailto:Wilson.C.Walters@usace.army.mil));
- Shaw Project Manager, Shaw Deputy Project Manager, or other designated Shaw management representative (promptly following immediate contacts above); and
- Property owner (subsequent to above contacts).

The Shaw field team leader may also contact the Chemical Warfare Design Center for consultation regarding items for which there is uncertainty regarding the potential hazard (e.g., broken glassware possibly consistent with CAIS vials). If a hazard is confirmed, the other notifications must be made. The Shaw field team shall not leave the vicinity of the known or potential RCWM or CAIS find, except as necessary to make required notifications, until directed to leave by the local emergency response authority, EOD team, property owner, or Shaw management representative. In the event that known or potential RCWM or CAIS is encountered, the Shaw Project Manager or other Shaw management representative is responsible for making the same notifications as specified for MEC involving conventional munitions described above.

## ***1.9 SSWP Organization***

This SSWP supplements the Work Plan (Shaw, 2006), which includes an Accident Prevention Plan and Site Safety and Health Plan (SSHP) in Appendix D, and a Sampling and Analysis Plan (SAP) in Appendix E that includes both the USACE Programmatic SAP and the Shaw SAP. The SAPs contain a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). The Work Plan, as amended by this SSWP, governs work that will be implemented during the SI at the FUDS. This SSWP provides additional information not available in the Work Plan,

including site information (background information, summary of historical documents evaluated, and resulting data needs), a discussion of activities to be conducted prior to mobilizing to the field, a presentation of field data to be collected, and appendices with supporting documents. Specifically, this SSWP includes the following sections:

- Section 1.0 Introduction,
- Section 2.0 Site Information,
- Section 3.0 Pre-Field Activities,
- Section 4.0 Site Inspection Activities,
- Section 5.0 Investigation-Derived Waste,
- Section 6.0 Proposed Schedule,
- Section 7.0 References,
- Figures,
- Tables,
- Appendix A Conceptual Site Model,
- Appendix B USACE Interim Guidance Document 06-05 and Safety Advisory 06-2,
- Appendix C Site Safety and Health Plan Addendum, and
- Appendix D Standard Operating Procedures.

## 2.0 Site Information

---

Unless otherwise referenced, the following historical and physical setting information in Sections 2.1 and 2.2 is taken from the ASR (ESE, 1985 and USACE, 2006a), the *ASR Supplement* (USACE, 2004b), and the *Site Specific Chemical Warfare Materiel (CWM) Scoping and Security Study Report* (Parsons, 2006). This section provides a summary of site-specific information not available in the Work Plan that was used to profile the site in development of the CSM.

### 2.1 Property Description and History

Fort Des Moines was established in 1901 as a cavalry post. Until 1917 multiple companies of infantrymen were stationed at Fort Des Moines. In 1917, Fort Des Moines became an Officers Training Camp for troops and a training camp for medical personnel. Fort Des Moines was converted to a hospital base in 1918 for soldiers recuperating from fighting in Europe. Between 1920 and the beginning of World War II, Fort Des Moines was occupied by a cavalry unit and elements of field artillery units. In 1940, Fort Des Moines was converted into a reception center for Iowa draftees. In 1942, Fort Des Moines was converted into the first training center for the Women's Army Auxiliary Corps. Fort Des Moines was officially closed as an installation on May 21, 1946 and the majority of the fort was declared surplus. The Fort Des Moines property was turned over to the War Assets Administration (WAA) on August 26, 1946, and the WAA subsequently assigned the land to the Federal Housing Authority. In 1958, Fort Des Moines was reacquired by the DoD and used as the Iowa Sector for the XIV Army Corps Reserve Training Center (USACE, 2006a). In 1976, the former cantonment area of Fort Des Moines was placed on the National Register of Historic Places as a National Historic Landmark District because of its rich cultural history as a training center.

The *CWM Scoping and Security Study Report* prepared for the FUDS stated that chemical warfare training was conducted at Fort Des Moines from the 1920s through the 1930s (Parsons, 2006). According to the report, Chemical Warfare Service chemical officers offered training courses that consisted of lectures on the defense against chemical warfare, demonstrations on the use of tear gas munitions in riot duty, gas mask drills, and demonstrations showing the methods of projecting chemical agents using rifle grenades and hand grenades filled with tearing agent, white phosphorus, or smoke. The training area was located on the southeast portion of the fort, on the west side of the Fort Des Moines Park, and on part of the present day city park public golf course. Records also indicate that chemical storage buildings were located at the former Fort Des Moines so that CWM, in the form of M1 Gas Identification Sets, Detonating CAIS, and 4-inch chemical mortars among various smoke and tear gas munitions, could be easily stored. This area is located on the northwest portion of the FUDS, approximately 3,000 ft northwest of the MRS. Although there is documentation indicating that these items were shipped to and stored at the fort, the only documented CWM to have been used at Fort Des Moines was CAIS.

There is no evidence that mortars containing chemical agents were used at Fort Des Moines (Parsons, 2006).

### ***2.1.1 Historical Military Use***

Site maps from 1961 and 1975 depict a “Rifle Range” on the FUDS property at the location of the revised Pistol Range MRS. A review of all available historical aerial photographs and reports suggests that the MRS was most likely used in the late 1950s, perhaps circa 1958 when Fort Des Moines was reacquired by the DoD and served again as a training center, to 1970 when the land was transferred to Polk County. Use of the MRS was limited to small arms where troops would have trained with rifle and pistol munitions of .45-caliber or less.

During the November 30, 2010 TPP meeting, the Education Coordinator with the Fort Des Moines Museum and Education Center located two engineering drawings that were prepared by the Fort Des Moines Office of the Facilities Engineer, dated April 1961 and September 1975. Both of these drawings indicated a “Rifle Range” at the revised location for the Pistol Range MRS. The 1967 aerial photograph indicates that the range’s length is approximately 100 yards (yd), often used for rifle ranges, and too great a distance to be used exclusively for pistol firing. For these reasons, the “pistol” range may have actually been a “rifle” range that was also used for firing pistols and rifles.

### ***2.1.2 Munitions Information***

Based on information in the ASR (USACE, 2006a), troops trained with small arms ammunition (.45-caliber or less) at the MRS. Additional details about the munitions reportedly used at the MRS are included in Table 1.

### ***2.1.3 Ownership History***

Fort Des Moines was comprised of 640 acres acquired between 1900 and 1908 by donation and purchase from six owners. Twelve non-acreage sewer easements were also acquired from 11 private landowners between 1902 and 1941. Fort Des Moines was closed as an Army installation in 1946 and transferred to the WAA on August 26, 1946. In 1958, the DoD regained control of the property and used the fort as a training center for the U.S. Army, Air Force, Navy, and Marine Corps.

In 1962, approximately 138 acres was declared excess and assigned to the city of Des Moines for eventual development of a city park, zoo, and golf course. An additional 198 acres was declared excess in June 1970 and assigned to the city of Des Moines for educational use (95 acres) and assigned to Polk County for the eventual development of a park (103 acres). The remaining Fort Des Moines acreage is comprised of the reserve center under the federal government.

The MRS is located on a parcel of land currently owned by Polk County and managed by the Polk County Conservation Board for use as the Fort Des Moines Park. Figure 4 shows the area tax parcels and current owners as of November 2010.

## ***2.2 Physical Setting***

### ***2.2.1 Topography and Vegetation***

The Fort Des Moines FUDS lies within the Dissected Till Plains section of the Central Lowland Province (United States Geological Survey [USGS], 2004). This area was glaciated, uplifted, and subsequently eroded into flat to rolling terrain that slopes gently towards the Missouri and Mississippi River Valleys. Elevations at the FUDS range from approximately 950 ft above mean sea level (AMSL) in portions of the northwestern and southwestern areas to approximately 850 ft AMSL at the intermittent creek located southeast of the lake in the southeastern portion of the FUDS (Figure 5).

The A.H. Blank Municipal Golf Course is located on the southwestern and northeastern portions of the FUDS and is comprised of landscaped grassy areas. The southeastern quadrant of the FUDS is developed as a county park and contains open grassy areas and densely wooded land surrounding an approximately 13-acre lake. The northern half of the FUDS is characterized by commercial and residential development interspaced with areas of maintained landscaping.

Elevations at the Pistol Range MRS range from approximately 915 ft AMSL in the northwestern portion near the earthen salvage wall to approximately 875 ft AMSL in the southeastern portion near the former firing line. The MRS is located in plant communities described as early successional mixed forest and shrubland/woodland (Rosburg, 2007). These areas have a thick understory of shrubs and vines and can be almost impenetrable. Since the closure of the range around 1970, an emergent wetland has developed on the former range floor with erect, rooted hydrophytic plants such as cattails, bulrushes, sedges, perennial forbs, and grasses.

### ***2.2.2 Surface Water***

The FUDS is positioned between the confluence of the Des Moines River and the Raccoon River located approximately 4 miles to the north and the North River located approximately 1.5 miles to the southeast (Figure 6). Unnamed intermittent creeks drain the FUDS from the south into Middle Creek, which joins the North River approximately 2 miles south of the site (U.S. Department of Agriculture [USDA], 1999).

The Pistol Range MRS is located approximately 150 ft northeast of a manmade lake. The lake is approximately 13 acres in size, about 30 ft deep at its greatest depth, and averages 15 ft in depth. According to the Polk County Conservation Board, the lake was constructed in 1976 during renovation of the property into a county park. According to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory online map, the unnamed lake is classified as a freshwater pond (USFWS, 2010a).

The Pistol Range MRS does not contain intermittent or perennial streams; however, a small wetland has developed near the base of the earthen salvage wall and extends throughout much of

the former range floor. The wetland has not been mapped as part of the USFWS National Wetlands Inventory.

As observed during the recent site visit performed after the TPP meeting in November 2010, the wetland appeared to be seasonally flooded at the very least and possibly permanently flooded throughout the year. It is quite likely that when surface water is absent, the water table will be at or very near the surface. It is possible that some surface runoff from the MRS range floor could occur (particularly during periods of seasonal flooding) with drainage to the east-southeast, towards an unnamed intermittent creek located near the southeastern border of the FUDS. The intermittent creek flows through a culvert beneath SE 5<sup>th</sup> Street and meanders in a generally southeasterly fashion where it empties into the North River located approximately 1.5 miles to the southeast.

### 2.2.3 Sensitive Environments

In a letter dated June 28, 2010, Shaw requested endangered species information from the USFWS, Rock Island Field Office, located in Moline, Iowa. A response from the USFWS has not been received to date. The following list of federally endangered and threatened species that occur within Polk County, Iowa was obtained from the USFWS website (USFWS, 2010b):

| Federal Status | Common Name                    | Scientific Name               | Habitat  |
|----------------|--------------------------------|-------------------------------|--|
| Endangered     | Indiana Bat                    | <i>Myotis sodalis</i>         | Caves, mines, small stream corridors with well developed riparian woods, and upland forests. |
| Endangered     | Least Tern                     | <i>Sterna antillarum</i>      | Bare alluvial and dredged island soil.   |
| Threatened     | Prairie Bush Clover            | <i>Lespedeza leptostachya</i> | Dry to mesic prairies with gravelly soil.  |
| Threatened     | Western Prairie Fringed Orchid | <i>Platanthera praeclara</i>  | Wet prairies and sage meadows.   |

The Indiana Bat's summer habitat includes forested areas near permanent bodies of water. Although the Pistol Range MRS contains preferred summer habitat for the Indiana Bat, there have been no reported sightings. Proposed field activities to be conducted during this SI will have minimal impact on the environmental setting and should not affect habitat should any be identified at the MRS.

The Iowa Department of Natural Resources (IDNR) lists 31 species (15 plants, 5 birds, 4 reptiles, 3 fish, 2 mammals, and 2 insects) that occur in Polk County and are on the threatened and endangered list (IDNR, 2011b). In a letter dated June 28, 2010, Shaw also requested an environmental review of natural resources from the IDNR Conservation and Recreation Division. The IDNR response states, "The Department has searched for records of rare species and significant natural communities in the project area and found no site-specific records that would be impacted by this project. However, these records and data are not the result of

thorough field surveys. If listed species or rare communities are found during the planning or construction phases, additional studies and/or mitigation may be required” (IDNR, 2010).

According to a Natural Resources Specialist with the Polk County Conservation Board, one of the State of Iowa threatened species, the Oval Ladies-tresses (*Spiranthes ovalis*) a perennial forb, may have potential habitat within the Fort Des Moines Park (Polk County Conservation Board, 2010).

An inventory of existing plant communities present within the Fort Des Moines Park was prepared in July 2007 by a professor of biology at Drake University (Rosburg, 2007). A total of 222 plant species were observed during the survey. One Iowa State special concern plant species was encountered in small numbers in a few populations in the Fort Des Moines Park. Bush’s sedge (*Carex bushii*) was identified approximately 300 ft north of the MRS. The plant community survey did not identify the Oval Ladies-tresses. A small emergent wetland (located on the MRS) was mapped during the survey (Rosburg, 2007).

This wetland apparently developed upon the former small arms range floor since the range closed circa 1970. The wetland extends from the former target area located near the base of the earthen salvage wall towards the former firing line area. The emergent wetland within the MRS most likely qualifies as an important ecological place (IEP) or sensitive environment as defined by USACE (2006b) or EPA (1997).

During the TPP meeting, IDNR indicated that a wetlands specialist with the State would be consulted to assist in determining the ecological importance of this wetland. Subsequent to the meeting, IDNR has contacted the Conservation and Recreation Division of the IDNR “to help determine the status of the shooting range area as it now exhibits wetland characteristics.” The request was made “to determine at what point does the State of Iowa consider an abandoned manmade structure to become an official wetland.” In response, the IDNR Conservation and Recreation Division stated that “IDNR does not make such determinations” and suggested that the Natural Resources Conservation Service (NRCS) be contacted to help with the determination. IDNR has made several attempts to contact the NRCS and has not received a response as of the date of the letter (IDNR, 2011c).

In 1976, the former cantonment area of Fort Des Moines was placed on the National Register of Historic Places (NRHP) as a National Historic Landmark District because of its history as a training center. The presence of sites on the NRHP or the presence of any known archaeological resources within the project area, has been confirmed with the Office of the State Archeologist (Shaw requested an archival file search in a letter dated December 30, 2010). According to the letter response dated February 18, 2011 from the Site Records Manager at their office, the Pistol Range MRS and immediate surroundings (i.e., the Fort Des Moines Park) do not contain known archeological resources or NRHP sites.

## **2.2.4 Climate**

The climate in the area is mid-continental with temperate heat and moderate rainfall. Temperatures are variable in the region and can change greatly from day to day and season to season. Temperatures can rise as high as 100 degrees Fahrenheit (°F) in the summer and as low as 15 or 20°F below zero in the winter. The highest monthly median temperature is 76°F, occurring in the month of July. The highest mean daily temperature of 86°F also occurs in July. The lowest mean temperature of 20.4°F occurs in January. Precipitation at the former Fort Des Moines occurs throughout the year, but mostly in the spring and summer months. From May to August, an average of 4.2 to 4.6 inches of precipitation occurs each month. The average annual precipitation is approximately 34.7 inches (National Oceanic and Atmospheric Administration, 2010).

## **2.2.5 Geologic and Hydrogeologic Setting**

### **2.2.5.1 Bedrock Geology**

The former Fort Des Moines is located in central Iowa at the northern end of the Southern Iowa Drift Plain. The last glacier to enter the state formed the Des Moines Lobe region, which is located just north of Fort Des Moines. Knobby moraine ridges and numerous wetlands are the direct result of a stagnant, disintegrating ice sheet. Across southern Iowa, erosion has carved these deposits into steeply rolling, well-drained terrain (Southern Iowa Drift Plain). Strong winds swept glacially ground “rock flour” from river floodplains, and the airborne silt was deposited as loess across much of the Iowa landscape (IDNR, 1997).

According to the ASR, “The Fort Des Moines site is located approximately three miles south of the Bemis terminal moraine associated with the Des Moines Lobe of the Wisconsin glaciation, which suggests the possibility that glacial outwash materials from this terminus could be present” (USACE, 2006a). The uppermost bedrock in the area of Fort Des Moines is Pennsylvanian age shale and limestone units of the Cherokee Group. Underlying the Cherokee Group is Mississippian age limestones and dolomites of the Meramec, Osage, and Kinderhook Series (USACE, 2006a). Iowa’s bedrock units dip gently to the southwest (IDNR, 1997).

### **2.2.5.2 Overburden Soils**

The most common soil types present in the FUDS area are the Lagoda silty clay loam, Sharpsburg silty clay loam, and the Sharpsburg-Urban land complex (USDA, 2009 and 2011). The Lagoda silty clay loam is comprised of moderately well-drained soil that forms from loess on slopes of 5 to 14 percent. This soil generally forms hill slopes. The saturated hydraulic conductivity is moderately low. The typical profile is silty clay loam from 0 to 60 inches. The Sharpsburg silty clay loams are comprised of moderately well drained soils that form from loess on slopes of 2 to 9 percent. These soils generally form hill slopes and the saturated hydraulic conductivity is moderately low. The typical profile is silty clay loam from 0 to 60 inches. The Sharpsburg-Urban land complex is a moderately well-drained soil that forms from loess on

slopes of 0 to 5 percent. This soil generally forms flats and hill slopes. The saturated hydraulic conductivity is moderately low to moderately high. The typical profile is silty clay loam from 0 to 60 inches.

The prominent soil types found in the northwestern portion of the MRS are formed from loess and subglacial till and include two soil types found on hill slopes: the Lagoda silty clay loam and the Gara clay loam. The Lagoda silty clay loam is a moderately eroded soil that is found on slopes of 9 to 14 percent and is moderately well drained. The typical soil profile is silty clay loam to a depth of 60 inches. The Gara clay loam soil is a moderately eroded soil found on slopes of 9 to 14 percent and is well drained. The typical soil profile is clay loam from 0 to 60 inches. The Lagoda and Gara loams consist of approximately 33 percent clay in the upper 24 inches of the soil horizon.

Present in the southeastern portion of the MRS (most likely comprising the portion of the MRS where the emergent wetland is located) is the Colo, occasionally flooded-Judson complex. The Colo is a poorly drained soil formed from silty alluvium forming drainage ways on slopes of 2 to 5 percent. The typical soil profile is silty clay loam from 0 to 60 inches. The Colo consists of approximately 31 percent clay in the upper 24 inches of the soil horizon. When inundated, the Colo has a very slow infiltration rate and consists chiefly of clays that have a high shrink-swell potential located within a high water table with a claypan or clay layer at or near the surface. These soils have a very slow rate of water transmission (USDA, 2009 and 2011).

### *2.2.5.3 Hydrogeology*

The uppermost bedrock aquifers include sandstone layers of the Pennsylvanian age Cherokee Group, a Mississippian aquifer consisting of alternating series of limestones and dolomites, and a Devonian aquifer, also consisting of limestones and dolomites, but which has a high content of evaporites. Surficial aquifers typically yield only about 0.001 cubic meters per second ( $\text{m}^3/\text{sec}$ ) or less. The deeper rock aquifers are much higher yielding, as much as 0.03 to 0.06  $\text{m}^3/\text{sec}$  greater in the Cambro-Ordovician layers. The city of Des Moines draws from the Cambro-Ordovician sandstone layers that yield about 0.11  $\text{m}^3/\text{sec}$ . Groundwater in glacial drift deposits is commonly encountered at 10 to 50 ft below ground surface (bgs) in Polk County. These depths may be considered representative of the depth to groundwater at Fort Des Moines (USACE, 2006a).

## *2.3 Population and Land Use*

### *2.3.1 Nearby Population*

The former Fort Des Moines is located south of the city of Des Moines, Polk County, Iowa. According to the 2000 U.S. Census, Des Moines had a population of 200,538 and a population density of 2,621.3 persons present per square mile. Polk County had a population of 429,439 and a population density of 657.9 persons present per square mile (U.S. Census, 2000). Census data within a 4-mile radius of the former Fort Des Moines is provided on Figure 7.

Two schools and two parks are located within the FUDS boundary. Eighteen schools, nine parks, two churches, and three airports are located within a 4-mile radius of the FUDS. The nearest school is located at the southeastern corner of the FUDS boundary (Figure 8).

### **2.3.2 Land Use**

The former Fort Des Moines is currently used as a reserve center (under control of the federal government), the Des Moines police academy, the A.H. Blank City Park (which includes a golf course and a zoo), and the Polk County Conservation Board's Fort Des Moines Park. Other uses include Studebaker Elementary School and McCombs Middle School, Somerset Apartments, and commercial/retail development. According to zoning maps maintained by the City of Des Moines, the FUDS is comprised of the following zones: "C-2 Retail" retail and highway-oriented commercial along the northwestern corner; "PUD" planned unit development near the northeastern and north-central portions; "A-1" agricultural district along the southeastern, central, and northeastern portions; and "R1-80" one family residential district on the southwestern quadrant and east-central portions (City of Des Moines, 2011).

The MRS is located on land zoned in an agricultural district, currently owned by Polk County, and managed by the Polk County Conservation Board (who renovated the parcel into the Fort Des Moines Park in the 1970s). The Fort Des Moines Park provides outdoor recreation, conservation education, and long-term protection of Polk County's natural heritage and is managed for recreational, educational and ecological purposes. The park's recreational uses include hiking on nature trails, picnicking (contains two picnic shelters), children's playground, a 1.5-acre arboretum, a ball field, and a 13-acre lake. The lake is used for boating (canoeing, kayaking, and electric motors only) and fishing; swimming is not permitted (Fort Des Moines Park, 2011). The Pistol Range MRS is located near a nature trail and the lake. Future land use for the MRS is expected to remain as a county park; however, future park improvements are possible.

### **2.3.3 Area Water Supply**

The drinking water source for the City of Des Moines (this includes the Fort Des Moines area and many surrounding areas within Polk County) is both surface water and groundwater and is supplied by the Des Moines Water Works (DMWW). The DMWW draws water from the Des Moines River, the Raccoon River, and an infiltration gallery. The infiltration gallery is a large horizontal well located in the sand and gravel sediment adjacent to the Raccoon River: the gallery yields river water and groundwater. The nearest source intake is located approximately 4 miles to the northwest of the FUDS at the DMWW Fleur Drive treatment facility adjacent to the Raccoon River (Des Moines Water Works, 2010).

According to the EPA Safe Drinking Water Information System, Polk County has 27 community based water systems (EPA, 2010b). The source of the water is surface water, purchased surface water, and groundwater. According to the IDNR database, there are 33 wells located within the

FUDS boundary (Figure 9). The status of these well is listed as “plugged use: monitoring” and “monitoring.” The Environmental Data Resources, Inc. (EDR) database indicates 15 well groupings on the FUDS. The well depths range from 21 to 49 ft bgs and the water depths range from 8 to 21 ft bgs (EDR, 2010b).

#### **2.3.4 Access**

The Fort Des Moines Park is located in southern Des Moines about 5 miles south of the central business district. The Park can be accessed by travelling south on SE 5<sup>th</sup> Street, crossing Army Post Road and turning west in 0.4 miles into Fort Des Moines Park. The MRS can be accessed by parking in the first available parking area inside the Park (about 0.2 miles from the Park entrance). From the parking area, the “Aspen Ridge Trail” footpath leads southeast approximately 250 yd to the northeastern portion of the lake located at the earthen dam. The Pistol Range MRS is located in the wooded area approximately 150 ft to the northeast.

### **2.4 TPP Summary**

A TPP meeting for the Fort Des Moines FUDS was conducted on November 30, 2010, at the Fort Des Moines Museum Meeting Room located on the property of the former Fort Des Moines installation in Des Moines, Iowa. Representatives from the IDNR, the city of Des Moines, the USACE-NWO, and Shaw were in attendance. A key stakeholder from the Polk County Conservation Board was unable to attend the meeting; however, a teleconference was held on December 9, 2010 with the Polk County representative and Shaw to review the information presented in the TPP meeting and to obtain the County’s concurrence on the proposed approach.

Shaw briefly reviewed the history of Fort Des Moines, historical aerial photographs, and a City of Des Moines land use planning study. The meeting focused on the revised location of the former small arms firing range and on proposed sampling activities under this SI. The TPP participants discussed whether the MRS qualifies as an IEP because of the presence of a relatively small wetland (estimated to be less than 1.0 acre in total area) that has developed on the former range floor since 1970. Final determinations regarding the IEP status of the MRS were not made during the meeting; however, Shaw has proceeded under the assumption that the MRS does qualify as an IEP.

TPP participants agreed that any potential MEC hazard that might exist at the former Pistol Range MRS relates only to intact or unfired small arms ammunition (which does not present a significant explosive hazard). These small arms ammunition typically consist of pistol calibers (.45, .22, and .38) and potentially the .30-caliber rifle. The use of rifles at the range is suspected because of the range’s length, as seen on the historical aerial photographs (approximately 100 yd). Stakeholders agreed to a meandering path MEC reconnaissance using a UXO technician with a magnetometer and an all-metals detector.

TPP participants agreed that the most likely potential MC is lead (and antimony used as a hardening agent) from the pistol or rifle caliber projectiles fired at the former range.

Additionally, copper and zinc were included because of their presence in the cartridge casings (along with antimony). Stakeholders agreed to the collection of four surface soil samples near the base of the salvage wall and three collocated sediment/surface water samples from the portion of the nearby wetland located nearest the salvage wall. All samples will be analyzed for lead, copper, zinc, and antimony.

After the meeting was completed, the representative from Shaw and the USACE-NWO conducted a brief site visit of the former Pistol Range MRS located in the Fort Des Moines Park.

The IDNR, the City of Des Moines and the USACE-NWO were in general agreement with the preliminary CSM, the SI approach, and the decision rules that were developed. TPP meeting results were documented in the *Final TPP Memorandum* (Shaw, 2011), which was issued final in March 2011 after incorporating comments received from stakeholders.

## ***2.5 Summary of Previous Investigations***

### ***2.5.1 Archives Search Report (ESE, 1985)***

ESE prepared an ASR in 1985 for the U.S. Army Toxic and Hazardous Material Agency (ESE, 1985). The ASR identified potential toxic and hazardous material sources on the installation. No small arms firing ranges were specifically identified on Fort Des Moines. The report states that a “pistol/rifle range was formerly located on that portion of property excessed to the Polk County Conservation Board” (ESE, 1985).

### ***2.5.2 Inventory Project Report (USACE, 1992)***

The USACE Missouri River Division completed an INPR in June 1992. The INPR references “several rifle and small arms ranges and training areas at the FUDS” and states that “projectiles and casings have been found during excavation for construction of a new housing development on the former site.” The INPR also states that “no live shells have been encountered.” The report recommended an ordnance/explosive waste site investigation for the former Fort Des Moines (USACE, 1992).

### ***2.5.3 ASR Supplement (USACE, 2004b)***

The *ASR Supplement* was issued in November 2004 for Fort Des Moines (USACE, 2004b). The *ASR Supplement* noted that the former Pistol Range was located in the area that is now the lake in Fort Des Moines Park. The report indicated a 20.1-acre pistol range with a firing direction to the southeast (shown in yellow on Figure 2 and Figure 3). The Pistol Range was assigned a Risk Assessment Code of 5.

### ***2.5.4 Archives Search Report (USACE, 2006a)***

The USACE, St. Louis District issued the Final ASR in December 2006 for the USACE Huntsville Center (the ASR was begun in 1993). As part of the ASR, an interview was conducted in September 1993 with Mr. Gary Bianchi, of the Fort Des Moines Engineering Office since 1975. According to the interview, the “old pistol range at the fort was now under a pond in

the park.” Further, he stated that “people have combed the woods on the southeast corner of the post with metal detectors and have found nothing.” A site visit was conducted at the FUDS in September 1993. The minutes from the visit stated “the outdoor pistol range and dump were also located in the park, but were found to be covered by a pond” (USACE, 2006a).

### ***2.5.5 Site Specific CWM Scoping and Security Study Report (Parsons, 2006)***

Parsons prepared a *Site Specific CWM Scoping and Security Study Report* for Fort Des Moines in December 2006 for the USACE Engineering and Support Center, Huntsville (USAESCH). The report documented CWM training at Fort Des Moines in select periods over a timeframe lasting from around 1924 to approximately 1944, usually only once or twice a year. The training included classroom training, outdoor demonstrations, and gas mask training with tear gas, chlorine gas, and CAIS (such as the K955 instructional CAIS and the K951 detonating CAIS) (Parsons, 2006). The areas formerly containing a Gas Chamber and a Gas Training Area are located within the Fort Des Moines Park on the western side of the lake approximately 1,500 ft from the Pistol Range MRS. A site visit was performed by personnel from USACE-NWO, USACE St. Louis, USAESCH, and Parsons in February 2003 to evaluate current site conditions and to confirm the findings of the ASR. The team observed the former Gas Training Area mostly covered by a pavilion, parking area, access roads, and landscaped areas within the park. The former Gas Chamber vicinity was wooded and consisted of thick underbrush. No evidence of CWM training or military structures remained in those areas (Parsons, 2006).

Because there is a remote potential that CAIS may remain at the areas formerly containing a Gas Chamber and a Gas Training Area, the report recommended the implementation of “institutional controls in the form of educational information to the stakeholders and public concerning the potential hazards associated with the former uses of this site. It is also recommended that recurring reviews be implemented in order to determine the effectiveness of these controls and to monitor for changing site conditions or new information” (Parsons, 2006).

### ***2.5.6 Inventory Project Report (USACE, 2010)***

As stated, the USACE revised the original 1992 INPR in June 2010 (USACE, 2010). Unlike the ASR and the *ASR Supplement*, the revised INPR does not describe the location of the Pistol Range MRS beneath the lake in Fort Des Moines Park or portray a firing direction to the southeast. The revised INPR maps the Pistol Range MRS as shown on Figure 3, near the northeastern corner of Fort Des Moines Lake and suggests that the direction of fire at the MRS is northwesterly. The revised INPR estimates that the Pistol Range is 30 yd wide by 50 yd in length (0.31 acres). The remainder of the 0.43-acre includes two closed indoor pistol ranges. Removal actions have occurred at these indoor ranges and are therefore not a part of this SI (USACE, 2010).

## 2.6 *Other Land Uses that May Have Contributed to Contamination*

A search of available environmental records was conducted by EDR as a part of general background information gathering for this FUDS (EDR, 2010). The EDR report was designed to meet the search requirements of EPA's *Innocent Landowners, Standards for Conducting an Appropriate Inquiry* (40 CFR Part 312) and the ASTM International (ASTM) *Standard Practice for Environmental Site Assessments* (E 1527-05) (ASTM, 2007). Shaw uses the report to further evaluate potential environmental risks associated with the FUDS.

A review of the databases provided in the EDR report identified facilities on the FUDS and within 0.25 mile of the Pistol Range MRS. None of the identified facilities are located in a position of potential influence to the MRS to contribute to metals in the site media. Other land uses that may have contributed to contamination at the MRS have not been identified.

## 2.7 *Preliminary Conceptual Site Model Summary*

The Pistol Range MRS was believed to be used circa 1958 to 1970 and presently is located within the Fort Des Moines Park. The small arms range was used for rifle and pistol firing with small arms ammunition such as .22-, .38-, and .45-caliber for pistols and .22- and .30-caliber for rifles. The only known use for the MRS was for small arms firing, and it is therefore expected to have an incomplete pathway for MEC. The potential presence of small arms ammunition poses no significant explosive hazard at the MRS. The MC of potential concern are selected metals (antimony, copper, lead, and zinc). Surface soil has been identified as the primary potentially complete pathway. MC would be derived from spent small arms ammunition (lead projectiles and fragments and cartridge cases) and would be deposited on site soil primarily in the earthen salvage wall that remains at the MRS and in the former target area.

Surface water and sediment are also considered to be potentially complete pathways because of the presence of an emergent wetland located on the former range floor of the MRS. Although the presence of a wetland at the MRS indicates a high water table, the interaction of surface water with deeper groundwater is not anticipated. The soils present at the portion of the MRS most likely impacted (target area and salvage wall) are poorly drained and consist of clay material at or near the surface horizon. The result is a very slow water transmission rate and a greatly inhibited ability for MC infiltration and an increased potential for binding with clay. For these reasons, the groundwater pathway is considered to be incomplete. The primary human receptors at the MRS are county park workers and the recreational site user at the Fort Des Moines Park.

Shaw is proceeding under the assumption that the small wetland within the MRS is an IEP. Because the significance of the wetland has not been fully evaluated, consideration of the wetland as an IEP may change. The MRS is in a wooded portion of the park with a dense understory of shrubs and vines that surround the small wetland. The CSM is discussed in greater detail in Appendix A.

### 3.0 *Pre-Field Activities*

---

#### 3.1 *Coordination with State Historic Preservation Office*

Shaw requested an archival file search in a letter dated December 30, 2010 to the Office of the State Archeologist maintained at the University of Iowa in Iowa City, Iowa. According to the letter response dated February 18, 2011 from the Site Records Manager in their office, the Pistol Range MRS and immediate surroundings (i.e., the Fort Des Moines Park) do not contain known archeological resources or NRHP sites.

Reconnaissance and sampling activities proposed as a part of this SI are anticipated to have minimal impact on the environmental setting. Based on the results of the archival file search, it is believed that there will be no impact to any archeological, historical, or cultural resources should any be identified at the MRS. Intrusive activities, e.g., large-scale digging or excavation, will not be conducted as part of the field activities. Environmental samples will be collected from within the areas of interest as indicated and will include only surface soil, sediment and surface water. Surface soil and sediment sampling will be contained within a small discrete area at a shallow depth (upper 6 inches).

In the unlikely event that the field team encounters potential cultural resources, work in that area will stop. The resource will be photographed and left in place. The location coordinates will be recorded using a hand-held global positioning system (GPS) and the area will be avoided. The data will be submitted to USACE for further evaluation. Sampling activities will move 50 ft from the discovered resource to avoid disturbance.

#### 3.2 *Coordination Regarding Natural Resources*

Shaw has coordinated with the USFWS, the IDNR, and the Polk County Conservation Board concerning the potential presence of threatened or endangered species at the MRS. The IDNR Conservation and Recreation Division stated in a written response received July 19, 2010, “The Department has searched for records of rare species and significant natural communities in the project area and found no site-specific records that would be impacted by this project. However, these records and data are not the result of thorough field surveys. If listed species or rare communities are found during the planning or construction phases, additional studies and/or mitigation may be required” (IDNR, 2010).

Additionally, Shaw has reviewed an inventory of existing plant communities present within the Fort Des Moines Park prepared in July 2007 by a professor of biology at Drake University (Rosburg, 2007). According to the survey, no federal or state-listed threatened or endangered species were identified on the Fort Des Moines Park; however, one Iowa special concern plant species (Bush’s sedge *Carex bushii*) was encountered in small numbers in a few populations (located approximately 300 ft north of the MRS).

Sampling activities to be conducted are anticipated to have minimal impact on the environmental setting, so it is believed that there will be no impact to any endangered or threatened species or critical habitat for these species should any be identified at the MRS during SI activities.

### ***3.3 Review of Historical Aerial Photographs***

A review of historical (1938, 1950, and 1967) aerial photographs of the FUDS has been completed as part of the preparation of this SSWP. The small arms firing range MRS is not visible on the 1938 or 1950 aerial photographs. The range is clearly visible on the 1967 aerial photograph (Figure 2). Visible features within the firing range in the 1967 photograph include the salvage wall, target area, and firing line.

### ***3.4 Coordination of Rights-of-Entry***

The Project Manager from the USACE-NWO office obtained the ROE for the Polk County property where field activities will be conducted from the Polk County Conservation Board on May 4, 2011.

### ***3.5 Equipment***

A hand-held fluxgate magnetometer (Schönstedt or equivalent) and an all-metal detector (White's or equivalent) will be used to support the reconnaissance effort. A hand-held GPS unit will be used to record the location of samples collected at the MRS, document the reconnaissance survey and identify the location of MEC, if found.

Surface water quality parameters will be collected during surface water sampling using a hand-held multi-parameter water quality instrument (e.g., YSI, Horiba, or equivalent). In addition, the surface water samples will be analyzed for hardness in the field using a field screening test kit (e.g., Hach or equivalent). A transfer vessel system will be used to filter surface water fractions being collected for ecological screening. The hand-pump device will work by pulling the water through a 0.45 micron filter into the laboratory-supplied sample container.

### ***3.6 Communications***

The primary means of on-site communication will be cellular telephones or radios. A satellite phone will be carried as a backup form of communication. The two-person field team (and any other accompanying parties) will remain together throughout all aspects of the field activities.

### ***3.7 Training and Briefing***

All site personnel will have completed the minimum training in accordance with 29 CFR 1910.120 (e) *Hazardous Waste Operations and Emergency Response (HAZWOPER)* and *Engineer Manual (EM) 385 1-1, Safety and Health Requirements Manual, Section 28, HAZWOPER* (USACE, 2008a). Standard training requirements for field activities (for FUDS work) are listed in the SSHP Addendum in Appendix C.

Any additional training will be conducted on site during the Daily Tailgate Safety Briefing, to include awareness of endangered species, culturally sensitive areas, and anticipated ordnance types. In addition, emphasis will be placed on the known presence of biota at the site.

## 4.0 *Site Inspection Activities*

---

The SI activities proposed at the FUDS are site reconnaissance and surface soil, sediment, and surface water sampling (if surface water is considered to be viable). SI field activities will be conducted in accordance with the SSHP Addendum (Appendix C). The SSHP Addendum is a supplement to the program-wide Accident Prevention Plan and SSHP contained in the Work Plan (Shaw, 2006). SI field activities will be documented in the field logbook.

### 4.1 *Key Personnel*

This section identifies key project personnel and their specific roles and responsibilities for each SI activity conducted at the FUDS. Additionally, this section defines the responsibilities, authority, and the interrelationships of all personnel who manage, perform, and verify activities affecting quality, particularly for personnel who need the organizational freedom and authority to:

- Initiate action to prevent the occurrence of nonconformance,
- Identify and record any quality problems,
- Initiate, recommend, or provide solutions through designated channels,
- Verify the implementation of solutions, and
- Control further processing, delivery, or installation of non-conforming items until the deficiency or unsatisfactory condition has been corrected.

**Project Manager** – The Shaw Project Manager will have overall responsibility, authority, and accountability for the project. Mr. Peter Kelsall is the Project Manager. He will provide additional management or technical support when needed and will serve as the final reviewer on all technical documents produced for the project.

**Chemical Quality Control Officer** – The Shaw Chemical Quality Control Officer shall ensure that all chemistry-related objectives, including responsibilities for DQO definitions, sampling and analysis, project requirements for data documentation and validation, and final project reports are attained. Mr. Tim Roth will serve as the Chemical Quality Control Officer for this project.

**Health and Safety Manager** – The Shaw Health and Safety Manager is responsible for the development and implementation of the SSHP and SSHP Addendum for the SI. Mr. Dave Mummert, CIH, will serve as the Health and Safety Manager for this project.

**Technical Lead** – The Shaw Technical Lead will oversee the technical aspects of the inspection activities. Mr. Greg Sisco will serve as the Technical Lead for this site. Although his presence is not required, Mr. Sisco may act as a team member during the field activities. He may also serve as an alternate Field Team Leader.

**Field Team Leader** – The Shaw Field Team Leader will be responsible for the management and execution of all field project activities in accordance with the approved Work Plan, as well as federal, state, and local laws and regulations. The Field Team Leader will also act as Site Safety and Health Officer. Ms. Cindy Burns will serve as the Field Team Leader for this site. The Field Team Leader will function as the primary point of contact for the stakeholders and field personnel, and will document technical progress, needs, potential problems, and recommended solutions.

**UXO Technician** – The UXO Technician will be responsible for the UXO avoidance measures to be implemented during field activities. The qualified UXO Technician will be identified in the SSHP Addendum, and the UXO Technician's name, database number, and qualifications will be provided to the USACE prior to commencing field work.

## ***4.2 Field Reconnaissance***

This section discusses the visual surface reconnaissance planned for the MRSs.

### ***4.2.1 Objectives***

A visual surface reconnaissance will be conducted along a meandering path through accessible portions of the MRS. The reconnaissance has the following main objectives:

- Document general site conditions (field logbook, photographs, and GPS waypoints) for each MRS, even if MEC has been documented from previous investigations or from SI reconnaissance.
- Identify and locate MEC, MD, and/or other evidence of range activities that may be present in order to test and verify the CSM (Appendix A) and to “ground truth” features seen on aerial photographs.
- Optimize sample locations, biased to locations where MC is most likely to be present.

UXO avoidance will be conducted during all SI field activities. If suspected MEC is observed at any point during field activities, the field team will respond according to the requirements of the SSHP and SSHP Addendum (in Appendix C), and make appropriate notifications in accordance with USACE direction (Appendix B). The team leader will also contact the Shaw Project Manager and will coordinate with the Shaw Senior UXO Supervisor for assistance in identifying items. Reconnaissance for the purpose of determining the presence or absence of MEC will be terminated, and further reconnaissance will be limited to the minimum amount necessary to document site conditions and determine appropriate sample locations if applicable. If evidence of munitions activity is observed that is inconsistent with the CSM, notification will be made to USACE and IDNR, and a variance to this SSWP would be submitted to initiate appropriate changes to the SI approach.

#### *4.2.1.1 Document General Site Conditions*

The following conditions, if present, will be recorded in the field logbook and documented by digital photographs as needed:

- Personnel and visitors on site;
- Weather conditions (including significant weather changes);
- Access limitations (fencing, gates, dense underbrush, wetland conditions, etc.);
- Land use (agriculture, development, buildings, campgrounds, dumping, etc.);
- Land disturbance (destruction of historic berms, excavation, fill, subsidence, etc.);
- Type and condition of vegetative cover and habitat (noting especially any distressed populations);
- Presence or potential presence of wildlife, including (but not limited to) endangered and threatened species; gallinaceous birds (grouse, pheasants, etc.), and waterfowl (ducks, geese, etc.);
- Wetlands or other features that would qualify the site as an IEP;
- Soil conditions;
- Presence or absence of surface water (streams, ponds, etc.);
- Direction of surface water flow;
- Location and condition of groundwater wells;
- Evidence of use of surface water or groundwater for human consumption, stock watering, or irrigation;
- General physical setting and topography;
- Features such as residences, schools, and churches that were called out on figures;
- Any activities that could result in contamination; and
- Photograph details (GPS waypoint, key features, direction, time, distance to key objects, etc.).

#### *4.2.1.2 Document Evidence of Military Activities*

A visual surface reconnaissance will be performed within the MRS to assess potential evidence of former military activities that could be used to verify the CSM. The following conditions will be recorded in the field logbook and documented by digital photographs and GPS:

- Presence or absence of MEC, shell casings, bullets or bullet fragments, or other MD;
- Location and physical description of range features such as firing line(s), target area(s), firing backstop or salvage wall, and historical military signs.

Based on USACE guidance, reconnaissance of this type will be limited to the identified former range areas, in the absence of evidence suggesting munitions-related activities in other portions of the FUDS.

#### **4.2.1.3 *Sample Locations***

Reconnaissance will also be used to select optimal sample locations; i.e., samples will be biased to locations with evidence of former munitions activity, if observed. The following conditions will be recorded in the field logbook (include text and sketches, when applicable) and documented by digital photographs:

- Rationale for selecting sample location (e.g., presence of MEC or MD, staining, distressed vegetation);
- Description of sample location (e.g., face of earthen salvage berm, behind or in front of target);
- Soil conditions (as appropriate); and
- Sediment or surface water conditions (as appropriate).

Background sample locations will be selected in areas that do not appear to have been impacted by past site operations based on criteria such as similarity to soils within the MRS (soil samples) and site accessibility (for sediment and surface water).

#### **4.2.2 *Reconnaissance Methods***

The site reconnaissance will be performed by conducting a visual inspection of appropriate and accessible portions of the range by a field team of two or more persons, including a qualified UXO technician. The UXO technician will supplement the visual inspection with the use of a hand-held fluxgate magnetometer (ferrous objects) and an all-metals detector (lead projectiles and copper or brass cartridge cases) in areas where vegetation or soil cover may obscure potential ferrous objects. The path walked during the reconnaissance will be recorded using a hand-held GPS unit. Reconnaissance will not include detailed mapping; however, GPS waypoints and tracks will be presented on SI figures. The reconnaissance effort will be concentrated in the general vicinity of the earthen salvage wall and former target area, as determined from historical evidence.

The magnetometer and all-metals detector will generally be used in areas where it would be difficult to see objects on the ground surface because of vegetation or other site conditions. The magnetometer may also be used around targets or in areas where subsurface MEC may reasonably be expected. The magnetometer should not be used in portions of the MRS if the ground surface is visible and there is no visual evidence indicating the presence of ferrous munitions-related objects, or in areas where interference from ferrous objects unrelated to munitions, such as buried utilities, are present.

### 4.2.3 *Extent of Reconnaissance*

Site reconnaissance will use available aerial photographs and a Geographic Information System base map developed from the ASR and other sources. Field crews will be provided both current and historical aerial photographs. Information shown on the reconnaissance base map will include MRS boundaries, property boundaries, information from reported MEC findings, topography, and current roads and buildings. One objective of reconnaissance is to “ground truth” features seen on aerial photographs (e.g., if targets are still visible, or if buildings have been removed or added).

The Polk County Conservation Natural Resources Specialist has indicated that some limited brush clearing has been performed around the MRS to assist the field crew in gaining access during the proposed field activities. At the former small arms firing range, the reconnaissance effort will be concentrated around the salvage wall (the earthen berm created as a range backstop) where MEC or MC are most likely to be found based on the CSM, the adjacent target area, and the vicinity of the former firing line. An additional objective of the reconnaissance will be to map the approximate lateral extent of the wetland using a handheld GPS (thus confirming its position within the MRS) and to assess the wetland’s connection to downslope drainage pathways.

The anticipated total length of the meandering path at the MRS is approximately 2,000 linear feet. Additionally, limited reconnaissance will be performed downrange of the salvage wall and up range of the firing line area. General site conditions will be documented throughout the MRS as appropriate.

### 4.3 *Field Sampling*

This SSWP details sampling to be conducted, by media, as discussed during the TPP meeting and documented in the *Final TPP Memorandum* (Shaw, 2011). The collection of surface soil, sediment, and surface water (if considered to be viable) is proposed for the MRS. Sample location rationale is presented in Table 2.

In all instances, samples will be collected using clean, new, disposable sampling equipment, such as a spoon or scoop and bowl. Nondisposable tools, such as a spade, shovel, or trowel, may be used to remove vegetation, roots, and gravel prior to collection of the soil and sediment samples. Surface soil, sediment, and surface water samples will be collected in accordance with this section and with the SAP/FSP Section 6.0 (Shaw, 2006). In addition, the following Shaw Standard Operating Procedures (SOPs) have been updated and included as Appendix D:

- SOP EI-FS101 Surface Soil Sampling with Trowel/Spoon, and
- SOP EI-FS113 Surface Water Sampling.

Sample designations and quality assurance/quality control (QA/QC) sample requirements are summarized in Table 3.

#### **4.3.1 MRS Samples**

The collection of seven samples are planned at the Pistol Range MRS (four surface soil samples, three sediment samples, and three collocated surface water samples, if considered viable) at locations where MC is predicted to be concentrated based on the preliminary CSM and the results of the visual reconnaissance. These samples are designed to assess the potential presence of MC associated with the firing of small arms munitions at the former range.

##### **4.3.1.1 Surface Soil Sampling**

The CSM predicts that the greatest concentration of MC would be located in the earthen salvage wall behind the target area. As agreed upon during TPP, four surface soil samples will be collected near the base of the wall where runoff and sedimentation would encourage the deposition of MC. Sampling locations will be determined in the field based on results of the visual reconnaissance. If physical evidence of past munitions activity is observed during site reconnaissance, sample locations will be adjusted and biased, using professional judgment, in accordance with the observed evidence and the CSM. If no evidence of past munitions activity is observed, samples will be collected at the approximate locations shown on Figure 10.

The surface soil samples will be collected as composite samples using the wheel method (7-point, wheel pattern with a 2-ft radius) at a depth of 0 to 6 inches bgs. The proposed sampling location rationale is described in Table 2 and the sample designations and proposed analysis is provided in Table 3. The surface soil samples will be analyzed for lead, copper, antimony, and zinc. In addition to the MC of concern, the surface soil samples will be analyzed for aluminum, calcium, iron, magnesium, and manganese to conduct a geochemical evaluation of background concentrations on the basis of analytical results, if warranted. Proposed sample locations are shown on Figure 10.

##### **4.3.1.2 Sediment and Surface Water Sampling**

Three collocated sediment and surface water samples will be collected from the wetland located on the former range floor in the former target area. Sediment samples will be collected as discrete grab samples. Surface water will only be collected from the wetland under certain field conditions to be determined by the field team at the time of sample collection. In particular, the depth and quality of the water will be ascertained. Sediment samples will be collected regardless of the presence of water. If conditions permit surface water sampling, the surface water will be collected both as filtered and unfiltered fractions.

Sampling locations will be determined in the field based on results of the visual reconnaissance. If physical evidence of past munitions activity is observed during site reconnaissance, sample locations will be adjusted and biased, using professional judgment, in accordance with the observed evidence and the CSM. If no evidence of past munitions activity is observed, samples will be collected at the approximate locations shown on Figure 10.

The proposed sampling location rationale is described in Table 2 and the sample designations and proposed analysis is provided in Table 3. The sediment and surface water samples will be analyzed

for lead, copper, antimony, and zinc. Geochemical reference elements will not be analyzed in sediment or surface water because the background data set only contains one sample and is therefore statistically insufficient. Proposed sample locations are shown on Figure 10.

#### ***4.3.2 Background Sampling***

Ten background surface soil samples (including one duplicate sample) will be collected outside of the boundaries of the MRS from an area not suspected to be affected by prior military activities (Figure 10). The background samples are proposed for collection from undisturbed woods to the north of the MRS in areas that do not appear to have been impacted by past site operations. The final sample locations will be determined in the field. The background samples will be collected using the same procedures and analyzed for metals and compared to the results from the samples collected at the MRS. The proposed background sampling is summarized in Table 3.

One collocated sediment and surface water background sample will be collected from one of the two headwaters that feed the 13-acre lake located adjacent to the MRS on the Fort Des Moines Park. These areas are positioned topographically upslope of the MRS. In the event that surface water at the MRS is considered by the field team at the time of sampling to be uncollectible, a background surface water sample will not be collected. Sediment samples will be collected regardless of the presence of water. The sediment sample will be wet or dry depending upon what type is collected from the Pistol Range MRS. If conditions permit surface water sampling, the surface water will be collected both as filtered and unfiltered fractions. The dissolved fraction is considered the bioavailable concentration and is used when performing ecological screening.

Actual background sample locations will be determined in the field after samples have been collected from the MRS. Estimated locations of background samples are shown in Figure 10. The background surface soil, sediment and surface water samples will be collected using the same procedures and analyzed for the same metals (lead, antimony, copper and zinc) as the samples collected at the MRS. Surface soil samples will also be analyzed for aluminum, calcium, iron, magnesium, and manganese to conduct a geochemical evaluation of background concentrations on the basis of analytical results, if warranted.

#### ***4.3.3 Quality Assurance/Quality Control Samples***

Quality control samples, including field duplicates and matrix spike/matrix spike duplicate samples, will be collected as detailed in Table 3. The IDNR will collect duplicate samples for quality assurance purposes during the SI at this MRS. The USACE-NWO Military Munitions Design Center will not collect quality assurance samples for this SI.

#### ***4.3.4 Sample Preservation, Packaging, and Shipping***

Sample preservation and packaging are provided in Shaw SAP/FSP Tables 4-1 and 4-2 in Appendix E of the Work Plan (Shaw, 2006). Sample shipment will follow the procedures

specified in Section 4.0 of the Shaw SAP/FSP. Completed analysis request/chain-of-custody records will be secured and included with each shipment of coolers per Section 7.1.3 of the Shaw SAP/FSP.

Samples will be shipped to the following laboratory:

**Test America - Denver**

4955 Yarrow Street

Arvada, Colorado 80002

Phone: 303.736.0156

Fax: 303.431.7171

Attention: Sample Receiving/M. Elaine Walker

#### ***4.4 Analytical Program***

Samples will be analyzed using EPA SW-846 Method 6020 for selected MC metals of concern (antimony, copper, lead, and zinc) in surface soil, sediment, and surface water (if collected). In addition to the MC of concern, the surface soil samples will be analyzed for aluminum, calcium, iron, magnesium, and manganese to conduct a geochemical evaluation of background concentrations on the basis of analytical results, if warranted.

For soil and sediment samples possibly impacted by small arms ammunition, samples will be passed through an ASTM No. 10 (2-millimeter) wire mesh sieve at the laboratory prior to analysis for lead to remove coarser particles and foreign objects, including large metallic lead fragments from bullets, which have a low degree of bio-availability (Interstate Technical and Regulatory Council, 2003).

Quality control samples, including field duplicates and matrix spike/matrix spike duplicate samples, will be collected in accordance with the Work Plan. No quality assurance (field split) samples are planned to be collected for the SI at the site.

In addition to the MC of potential concern, the samples collected will be analyzed for the primary elements aluminum, calcium, iron, magnesium, and manganese and used for a geochemical evaluation of the background concentrations on the basis of the MRS results, if warranted.

Aluminum, calcium, iron, and magnesium will be analyzed by EPA SW-846 Method 6010B. Manganese will be analyzed by EPA SW-846 Method 6020. Sample designations and analyses are presented in Table 3.

Soil and sediment samples will be analyzed using EPA SW-846 methodology as presented in Section 5.0 of the NWO FUDS QAPP in Appendix E of the Work Plan (Shaw, 2006). Chemical data will be reported via a hard-copy data package and electronic format following the requirements described in the Shaw SAP/FSP Sections 7.1 and 7.2 (Appendix E) of the Work Plan and applicable portions of the USACE QAPP (Shaw, 2006). These data deliverables will be validated in accordance to the requirements referenced in Section 8.2 of the Shaw SAP/FSP.

## 4.5 *Background and Screening Values*

A comparison of site sample data to background data will be necessary to distinguish a munitions-related release from ambient conditions resulting from naturally occurring or anthropogenic sources. Where the body of background data includes sufficient samples (in this case, surface soil), a background threshold comparison of site concentrations to the background 95th upper tolerance limit or 95th percentile, as appropriate, will be made (EPA, 1989, 1992a, 1994, and 2002). If one or more site samples exceed the background threshold, the following tests may also be applied:

- A nonparametric comparison of the central tendencies or medians of the site and background distributions, using the Wilcoxon rank sum test (EPA, 1994, 2002, and 2006).
- A geochemical evaluation including correlation plots of trace element versus reference element concentrations (EPA, 1995; Myers and Thorbjornsen, 2004; Thorbjornsen and Myers, 2007), for any element that fails either of the above two statistical tests. The primary reference elements include aluminum, calcium, iron, magnesium, and manganese.

Because the boundaries of the emergent wetland present on the former range floor are most likely contained within the portion of the range located between the salvage wall/target area and the firing lines, a suitable location for the collection of background surface water and sediment samples has not been identified in the immediate vicinity of the MRS. Shaw has identified two potentially suitable wetland areas for the collection of a background sediment/surface water sample. The areas are located approximately 1,300 ft to the west of the MRS at the headwaters of the adjacent pond (Figure 10). The field team will select the location that appears the most representative or similar to the MRS and therefore the most appropriate as a background locale. The surface water sample will be collected as both a total (unfiltered) fraction and a dissolved (filtered) fraction.

Because the body of background data is limited for the sediment and surface water samples, the site-to-background comparison will be conducted according to guidance for SI activities and HRS scoring (EPA, 1992b). A comparison is made to determine whether a hazardous substance in the media is “significantly above the background level” according to the HRS criteria (EPA, 1990, Table 2-3):

1. If the sample measurement is less than or equal to the sample quantitation limit, no observed release is established.
2. If the sample measurement is greater than or equal to the sample quantitation limit, then:
  - If the background concentration is not detected, an observed release is established when the sample equals or exceeds the sample quantitation limit.
  - If the background concentration equals or exceeds the detection limit, an observed release is established when the sample is three times or more above the background concentration.

Background threshold values, for comparison to site data per the above HRS criteria, are three times the maximum detected background concentration. For analytes not detected in background samples, the background threshold is the sample quantitation limit. If field conditions prevent the collection of a background sediment or surface water sample, the results of the three sediment/surface water samples collected at the MRS will only be compared to the human health and ecological screening criteria.

MRS sample data that exceed background concentrations for surface soil, sediment, and surface water will be compared to appropriate human health screening criteria to determine whether additional investigation should be recommended. The IDNR Statewide Soil Standards (IDNR, 2011a) are proposed as the human health screening criteria for antimony, lead, and zinc in surface soil/sediment at the MRS. The State does not have a screening value for copper; therefore, the EPA Regional Screening Level (RSL) for residential soil is recommended for surface soil and sediment (Table 4). IDNR Human Health Screening Values (IDNR, 2011a) are proposed as the human health screening criteria for antimony, copper, and zinc in surface water at the MRS (Table 5). IDNR defers to the EPA RSL maximum contaminant level for lead.

MRS sample data that exceed background concentrations for surface soil, sediment, and surface water will be compared to the appropriate ecological screening values (ESVs) to determine whether additional investigation should be recommended. The IDNR does not have ESVs for soil or sediment. Therefore, proposed ESVs for surface soil samples collected at the MRS are based on the following hierarchy: 1) EPA Ecological Soil Screening Level (Eco SSL), 2) Los Alamos National Laboratory (LANL) Ecological Screening Level (ESL), or 3) the Oak Ridge National Laboratory (ORNL) Soil Preliminary Remediation Goal (PRG) (Table 6). Proposed ESVs for sediment samples collected at the MRS are based on the following hierarchy: 1) MacDonald, et al. (2003), 2) LANL ESLs, or 3) ORNL PRGs (Table 7). Proposed ESVs for surface water samples collected at the MRS are based on the following hierarchy: 1) IDNR water quality criteria (Class B aquatic life criteria), 2) EPA National Ambient Water Quality Criteria, 3) LANL ESLs, or 4) ORNL PRGs (Table 8).

#### ***4.6 Site-Specific Information/Data***

In addition to observations and data to be obtained from field activities discussed in Sections 4.2 and 4.3, site-specific information/data will be collected for the FUDS and the MRS to supplement that found in the available historic documentation. This site information may be supplemented with requests from agency contacts (e.g., USFWS, IDNR, etc.) and local site contacts, if applicable. Site-specific information/data may include geology, climate, hydrogeology, federally and state-listed threatened and endangered species known to occur on site, sensitive habitats, wetlands, cultural and archeological resources, water resources, vegetation, presence of nearby waste disposal sites, and impact mitigation measures, if relevant.

Further data collection will be conducted to complete the MRSPP scoring sheets and to collect the pertinent MC-related scoring information. The primary information needed to complete the MRSPP scoring, such as munitions type and hazard source will come from historical site documentation. To further supplement current on- and off-site information needed for receptor scoring, additional data will be collected on the current on- and off-site activities/structures, population density, CERCLA sites, Resource Conservation and Recovery Act sites, well locations, and water supply information.

## *5.0 Investigation-Derived Waste*

---

Investigation-derived waste (IDW) will be managed in accordance with Work Plan Section 9.0 of Shaw's FSP (Shaw, 2006). All IDW is presumed nonhazardous unless field observations indicate otherwise and will be managed as specified below:

- Personal protective equipment and disposable equipment (i.e., gloves, disposable sampling scoop): Bagged and placed into an approved dumpster located on the Fort Des Moines Park to be routed to a municipal landfill;
- Excess surface soil, sediment, and surface water: Returned to the source (i.e., ground surface or wetland); and
- Any water used in cleaning of stainless steel or other reusable sampling equipment: Poured on ground surface.

## 6.0 *Proposed Schedule*

---

The proposed schedule for field activities and reporting is provided below. The timing of the field activities assumes there will be no delays because of inclement weather.

- Final SSWP Submitted May 2011.
- Field Work Notification for IDNR and Polk County Conservation Board  
2 weeks prior to mobilization.
- Field Work Timeframe June/July 2011.
- Draft SI Report Submitted September 2011.
- Draft SI Report Comments Due October 2011.
- Draft Final SI Report Submitted November 2011.
- Draft Final SI Report Comments Due December 2011.
- Second TPP Meeting December 2011.
- Final SI Report Submitted January 2012.

## 7.0 References

---

- 29 CFR 1910.120 (Code of Federal Regulation Title 29, Part 1910). *Occupational Safety and Health Standards, Hazardous Waste Operations and Emergency Response*. Website: <http://www.gpoaccess.gov/cfr/index.html>. January 1, 2007.
- 32 CFR 179.3 (Code of Federal Regulation Title 32, Part 179). 2007. *Munitions Response Site Prioritization Protocol (MRSP)*. Website: <http://www.gpoaccess.gov/cfr/index.html>. Washington, D.C. August 22, 2007.
- 40 CFR 300 (Code of Federal Regulation Title 40, Part 300). 2006. *National Oil and Hazardous Substances Pollution Contingency Plan*. Website: <http://www.gpoaccess.gov/cfr/index.html>. Washington, D.C. October 4, 2006.
- 40 CFR 312 (Code of Federal Regulation Title 40, Part 312). 2006. *Innocent Landowners, Standards for Conducting an Appropriate Inquiry*. Website: [http://www.access.gpo.gov/nara/cfr/waisidx\\_06/40cfr312\\_06.html](http://www.access.gpo.gov/nara/cfr/waisidx_06/40cfr312_06.html). July 1, 2006.
- 10 USC 2701 et seq. (U.S. Code Title 10, Part 2701). 2004. *Chapter 160 – Environmental Restoration, Sec. 2701 Environmental restoration program*. U.S. Government Printing Office. Website: [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse\\_usc&docid=Cite:+10USC2701](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+10USC2701). January 20, 2004.
- 10 USC 2710 et seq. (U.S. Code Title 10, Part 2710). 2005. *Chapter 160 – Environmental Restoration, Sec. 2710 Inventory of unexploded ordnance, discarded military munitions, and munitions constituents at defense sites (other than operational ranges)*. U.S. Government Printing Office. Website: <http://frwebgate2.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=33328023600+0+0+0&WAISaction=retrieve>. January 3, 2005.
- 42 USC 9601 (U.S. Code Title 42, Part 9601). 2003. *Hazardous Substances Releases, Liability, and Compensation*. U.S. Government Printing Office. Website: <http://frwebgate5.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=209840153119+0+0+0&WAISaction=retrieve>. January 7, 2003.
- ASTM International (ASTM). 2007. ASTM E 1527-05, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*.
- City of Des Moines. 2008. *Des Moines SuperBlock Southside Planning Study*. Prepared by the City of Des Moines (and contractors). March 2008.
- City of Des Moines. 2011. Information Technology, Interactive Maps, Zoning map. Website: <http://arcgis.dmgov.org/extmaps/>. Queried January 2011.
- Department of Defense (DoD). 2001. *Management Guidance for the Defense Environmental Restoration Program*. Office of the Deputy Under Secretary of Defense (Installations and Environment). September 2001.

Department of Defense (DoD). 2001. *Management Guidance for the Defense Environmental Restoration Program*. Office of the Deputy Under Secretary of Defense (Installations and Environment). September 2001.

Department of Defense (DoD). 2009. *Defense Environmental Programs Annual Report to Congress Fiscal Year 2009, Munitions Response Site (MRS) Inventory*. Website: <http://deparc.xservices.com/do/mmrp>.

Department of Defense Explosives Safety Board (DDESB). 2004. *Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel*. DDESB Technical Paper (TP) 18. Website: <http://www.ddesb.pentagon.mil/techpapers.html>. December 20, 2004.

Des Moines Water Works. 2010. Website: <http://www.dmww.com/>. Queried December 2010.

Environmental Data Resources, Inc. (EDR). 2010. *The EDR Radius Map with GeoCheck®*, Ft. Des Moines, Des Moines, Iowa. Inquiry Number: 02888241.14r. October 6, 2010.

Environmental Science and Engineering, Inc. (ESE). 1985. *Archives Search Report of Fort Des Moines, Polk County, Iowa*. Prepared for U.S. Army Toxic and Hazardous Materials Agency. May 1985.

Environmental Systems Research Institute (ESRI). 2006. StreetMap 2006 database distributed with ArcGIS software. ESRI, 380 New York Street, Redlands, California. Website: <http://www.esri.com/>.

Executive Order 12580. 1987. *Superfund Implementation*. 52 FR 2923. January 23, 1987. Website: <http://www.archives.gov/federal-register/codification/executive-order/12580.html>.

Executive Order 13016. 1996. *Amendment to Executive Order No. 12580*. 61 FR 45871. August 28, 1996. Website: <http://www.archives.gov/federal-register/executive-orders/1996.html>.

Fort Des Moines Park. 2011. Website: <http://www.mycountyparks.com/County/Polk/Park/Fort-Des-Moines-Park.aspx>. Queried January 2011.

Interstate Technical and Regulatory Council. 2003. *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*. Technical Regulatory Guidelines.

Iowa Department of Natural Resources (IDNR). 1997. Iowa Geological and Water Survey. Adapted from *Iowa's Earth History Shaped by Ice, Wind, Rivers, and Ancient Seas* by Jean Cutler Prior. Website: <http://www.igsb.uiowa.edu/Browse/geoiowa/GEOIOWA.HTM>.

Iowa Department of Natural Resources (IDNR). 2007. Iowa Final Rule ARC 6352B – Water Quality Standards, Criteria for Chemical Constituents. Effective November 28, 2007.

Iowa Department of Natural Resources (IDNR). 2010. Letter from Daryl Howell, Environmental Specialist (IDNR) to Greg McGraw (Shaw). Subject: Environmental Review for Natural Resources, Polk County, Sections 33 and 44, Township 78N, Range 24W. Undated letter received July 19, 2010.

Iowa Department of Natural Resources (IDNR). 2011a. Statewide Standards for Contaminants. Website: <https://programs.iowadnr.gov.riskcalc/pages/standards.aspx>. Queried January 2011.

Iowa Department of Natural Resources (IDNR). 2011b. Natural Areas Inventory. Website: <https://programs.iowadnr.gov/naturalareasinventory/pages/Query.aspx>. Queried February 2011.

Iowa Department of Natural Resources (IDNR). 2011c. Letter from Dan Cook, Senior Environmental Specialist, Contaminated Sites Division to John Miller, USACE-NWO. Dated March 15, 2011.

Iowa Geological Survey, Natural Resources GIS Library. 2010. Groundwater Well Data. Website: <http://www.igsb.uiowa.edu/nrgislibx/>.

Iowa State University GIS Facility. 2010. Aerial photograph, dated 1967. Website: <http://ortho.gis.iastate.edu/>.

Los Alamos National Laboratory (LANL). 2010. *Eco Risk Database*. Release 2.5. Wildlife values.

MacDonald, D.D, C.G. Ingersoll, D.E. Smorong, R.A. Lindskoog, G. Sloane and T. Biernacki. 2003. *Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters*. Florida Department of Environmental Protection Technical Report.

Myers, J. and K. Thorbjornsen. 2004. *Identifying Metals Contamination in Soil: A Geochemical Approach*. Soil & Sediment Contamination: An International Journal, Vol. 13, No. 1, pp. 1-16.

National Oceanic and Atmospheric Administration. 2010. National Climatic Data Center. Website: <http://www.ncdc.noaa.gov/oa/ncdc.html>. Queried December 2010.

Oak Ridge National Laboratory (ORNL). 1997. Preliminary Remediation Goals for Ecological Endpoints for Sediment, ES/ER/TM-162/R2.

Parsons. 2006. *Final Site Specific Chemical Warfare Materiel Scoping and Security Study Report, Fort Des Moines FUDS No. B07IA072903*. Prepared for U.S. Army Engineering and Support Center, Huntsville (USAESCH). December 5, 2006.

Polk County Assessor. 2010. Parcel data. Website: <http://www.assess.co.polk.ia.us/>.

Polk County Conservation Board. 2010. Email correspondence from Mr. Loren Lown, Natural Resources Specialist (Polk County Conservation Board) to Mr. Greg Sisco, MMRP Technical Lead (Shaw). Subject: Ft Des Moines TPP Meeting. October 29, 2010.

Rosburg, Thomas, PhD. 2007. *Botanical Survey For Fort Des Moines County Park*. Prepared for Polk County Conservation Board by Thomas Rosburg, Associate Professor of Biology, Drake University, Des Moines, Iowa. July 6, 2007.

Shaw Environmental, Inc. (Shaw). 2006. *Final Type I Work Plan, Site Inspections at Multiple Sites, NWO Region, Formerly Used Defense Sites, Military Munitions Response Program*. Prepared for U.S. Army Corps of Engineers. February 2006.

Shaw Environmental, Inc. (Shaw). 2011. *Final Technical Project Planning Memorandum, Fort Des Moines, FUDS Property No. B07IA0729*. Prepared for the U.S. Army Corps of Engineers. March 2011.

Thorbjornsen, K. and J. Myers. 2007. *Identification of Metals Contamination in Firing-Range Soil Using Geochemical Correlation Evaluation*. Soil & Sediment Contamination, Vol. 16, No. 4, pp. 337-349.

U.S. Army Corps of Engineers (USACE). 1992. *DERP-FUDS, Inventory Project Report for Site No. B07IA0729, Fort Des Moines, Polk County, Iowa*. June 1992.

U.S. Army Corps of Engineers (USACE). 2004a. *Defense Environmental Restoration Program (DERP) Formerly Used Defense Sites (FUDS) Program Policy*. Engineer Regulation (ER) 200-3-1. May 10, 2004.

U.S. Army Corps of Engineers (USACE). 2004b. *ASR Supplement, Fort Des Moines, Pistol Range MRS*. November 2004.

U.S. Army Corps of Engineers (USACE). 2005. *Formerly Used Defense Sites (FUDS) Military Munitions Response Program (MMRP) Site Inspections. Program Management Plan*. February 2005.

U.S. Army Corps of Engineers (USACE). 2006a. *Archives Search Report, Fort Des Moines, Polk & Warren Counties, Iowa*. December 2006.

U.S. Army Corps of Engineers (USACE). 2006b. *Screening-Level Ecological Risk Assessments for FUDS MMRP Site Inspections*. Prepared by USACE HTRW CX. August 11, 2006.

U.S. Army Corps of Engineers (USACE). 2008a. *Safety and Health Requirements Manual*. Engineer Manual (EM) 385-1-1. September 15, 2008.

U.S. Army Corps of Engineers (USACE). 2008b. *Explosives Safety and Health Requirements Manual*. Engineer Manual (EM) 385-1-97. September 15, 2008.

U.S. Army Corps of Engineers (USACE). 2010. *DERP-FUDS, Revised Inventory Project Report (INPR) for Property No. B07IA0729, Fort Des Moines, Des Moines, Iowa*. June 2010.

U.S. Census. 2000. Website: <http://www.census.gov/main/www/cen2000.html>. Queried December 2010.

U.S. Department of Agriculture (USDA). 1999. Topographic maps, Polk and Warren counties. USDA Service Center Agencies.

U.S. Department of Agriculture (USDA). 2009. *Natural Resources Conservation Service, Web Soil Survey of the National Cooperative Soil Survey*. Interactive online database. Website: <http://websoilsurvey.nrcs.usda.gov/app/>. Queried December 2010.

U.S. Department of Agriculture (USDA). 2010. Aerial photographs, Polk and Warren counties. USDA Service Center Agencies, USDA-APFO National Agriculture Imagery Program.

U.S. Department of Agriculture. 2011. *Custom Soil Resource Report for Polk County, Iowa*. January 4, 2011.

U.S. Environmental Protection Agency (EPA). 1989. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance*. Office of Solid Waste, Waste Management Division. USEPA/530/SW-89/026. July 1989.

U.S. Environmental Protection Agency (EPA). 1990. *Appendix A to Part 300 – The Hazard Ranking System*, Title 40 CFR Part 300, 55 FR 51624. December 14, 1990.

U.S. Environmental Protection Agency (EPA). 1992a. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance*. Environmental Statistics and Information Division, Office of Policy, Planning, and Evaluation. USEPA/530/R-93/003. July 1992.

U.S. Environmental Protection Agency (EPA). 1992b. *Guidance for Performing Site Inspections Under CERCLA, Interim Final*. Office of Emergency and Remedial Response, Washington DC. EPA 540-R-92-021, Directive # 9345.1-05. September 1992.

U.S. Environmental Protection Agency (EPA). 1994. *Statistical Methods for Evaluating the Attainment of Cleanup Standards*. Environmental Statistics and Information Division, Office of Policy, Planning, and Evaluation. USEPA/230/R-94/004. June 1994.

U.S. Environmental Protection Agency (EPA). 1995. *Determination of Background Concentrations of Inorganics in Soils and Sediments at Hazardous Waste Sites*. Office of Research and Development. EPA/540/S-96/500. December 1995.

U.S. Environmental Protection Agency (EPA). 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecologic I Risk Assessments (ERAGS)*. EPA/540/R-97/006, OSWER Directive # 9285.7-25. June 1997.

U.S. Environmental Protection Agency (EPA). 2002. *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites*. Office of Emergency and Remedial Response. USEPA/540/R-01/003. September 2002.

U.S. Environmental Protection Agency (EPA). 2006. *Data Quality Assessment: Statistical Methods for Practitioners*. Office of Environmental Information, EPA/240/B-06/003. February 2006.

U.S. Environmental Protection Agency (EPA). 2007. *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs)*. Office of Solid Waste and Emergency Response. Website version last updated April 2007: <http://www.epa.gov/ecotox/ecossl>.

U.S. Environmental Protection Agency (EPA). 2009. National Ambient Water Quality Criteria (NAWQC). Website: <http://water.epa.gov/scitech/swguidance/waterquality/standards/current/index.cfm>.

U.S. Environmental Protection Agency (EPA). 2010a. *Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites*. Websites: [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/) and <http://www.epa.gov/reg3hwmd/risk/human/index.htm>. November 2010. Queried January 2011.

U.S. Environmental Protection Agency (EPA). 2010b. *Safe Drinking Water Information System*. Website: [http://www.epa.gov/enviro/html/sdwis/sdwis\\_query.html](http://www.epa.gov/enviro/html/sdwis/sdwis_query.html). Queried January 2011.

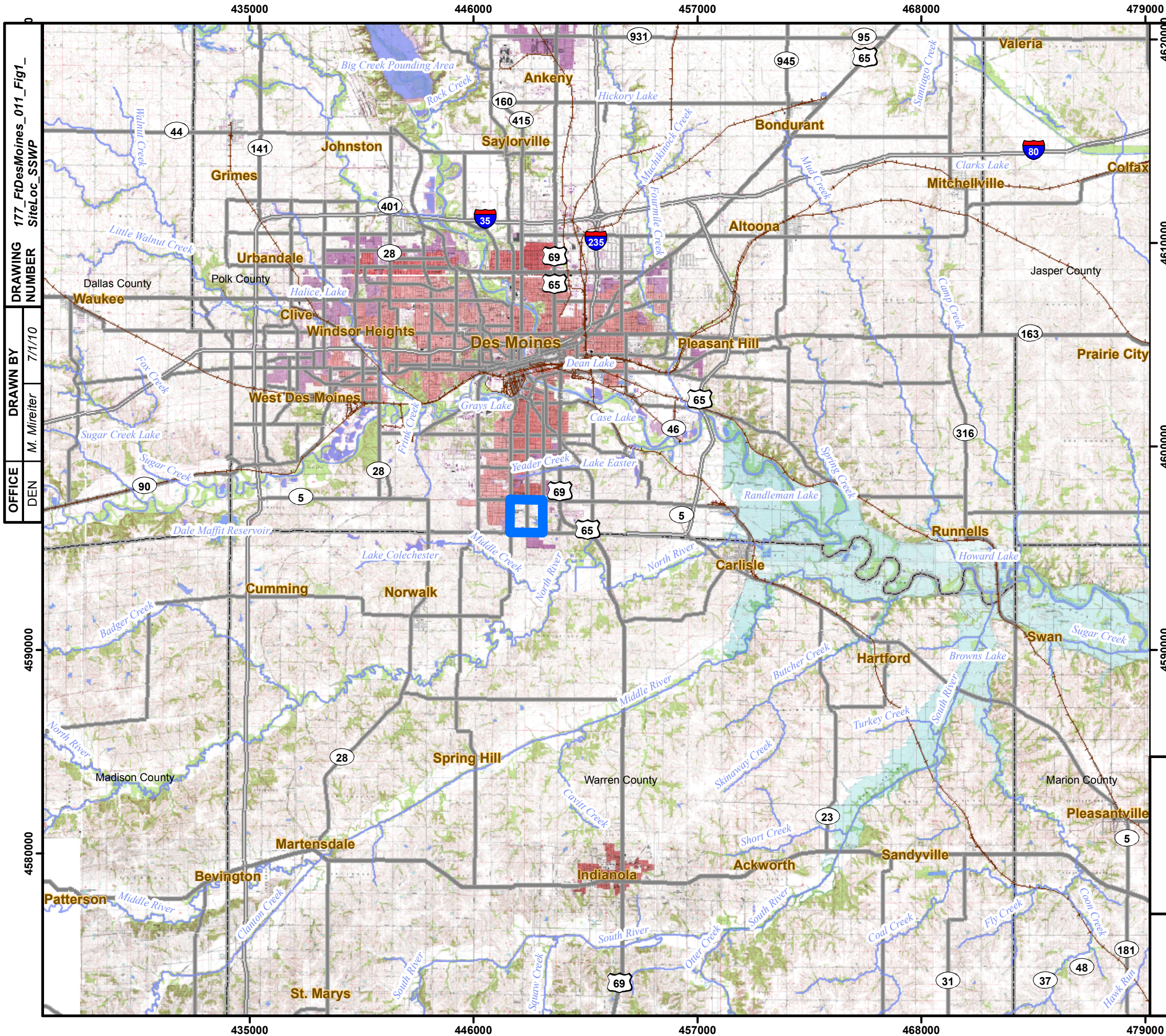
U.S. Fish and Wildlife Service (USFWS). 2006. NWIDBA.CONUS\_wet\_poly: Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, FWS/OBS-79/31. Branch of Habitat Assessment, Washington, D.C. May 2006.

U.S. Fish and Wildlife Service (USFWS). 2010a. *National Wetlands Inventory (NWI), On-line Wetlands Mapper*. Website: <http://www.fws.gov/wetlands/Data/Mapper.html>. October 1, 2010.

U.S. Fish and Wildlife Service (USFWS). 2010b. Iowa County Distribution of Federally Threatened, Endangered, Proposed and Candidate Species. Website: [http://www.fws.gov/midwest/endangered/lists/iowa\\_pty.html](http://www.fws.gov/midwest/endangered/lists/iowa_pty.html). Last updated September 14, 2010. Queried December 2010.

United States Geological Survey (USGS). 2004. *A Tapestry of Time and Terrain, The Union of Two Maps – Geology and Topography*. Website: <http://tapestry.usgs.gov/>. Queried November 2010.

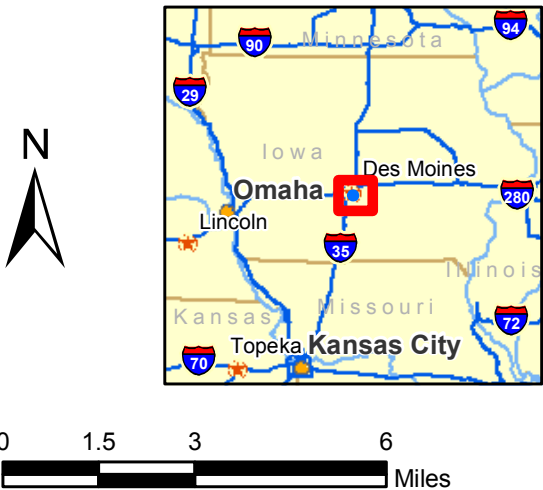
## *Figures*



**Legend**

Fort Des Moines FUDS Boundary

- NOTES:
- 1) FUDS property boundary was obtained from the Fort Des Moines ASR Supplement (USACE, 2004).
  - 2) Topographic maps (Polk and Warren Counties) were obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.

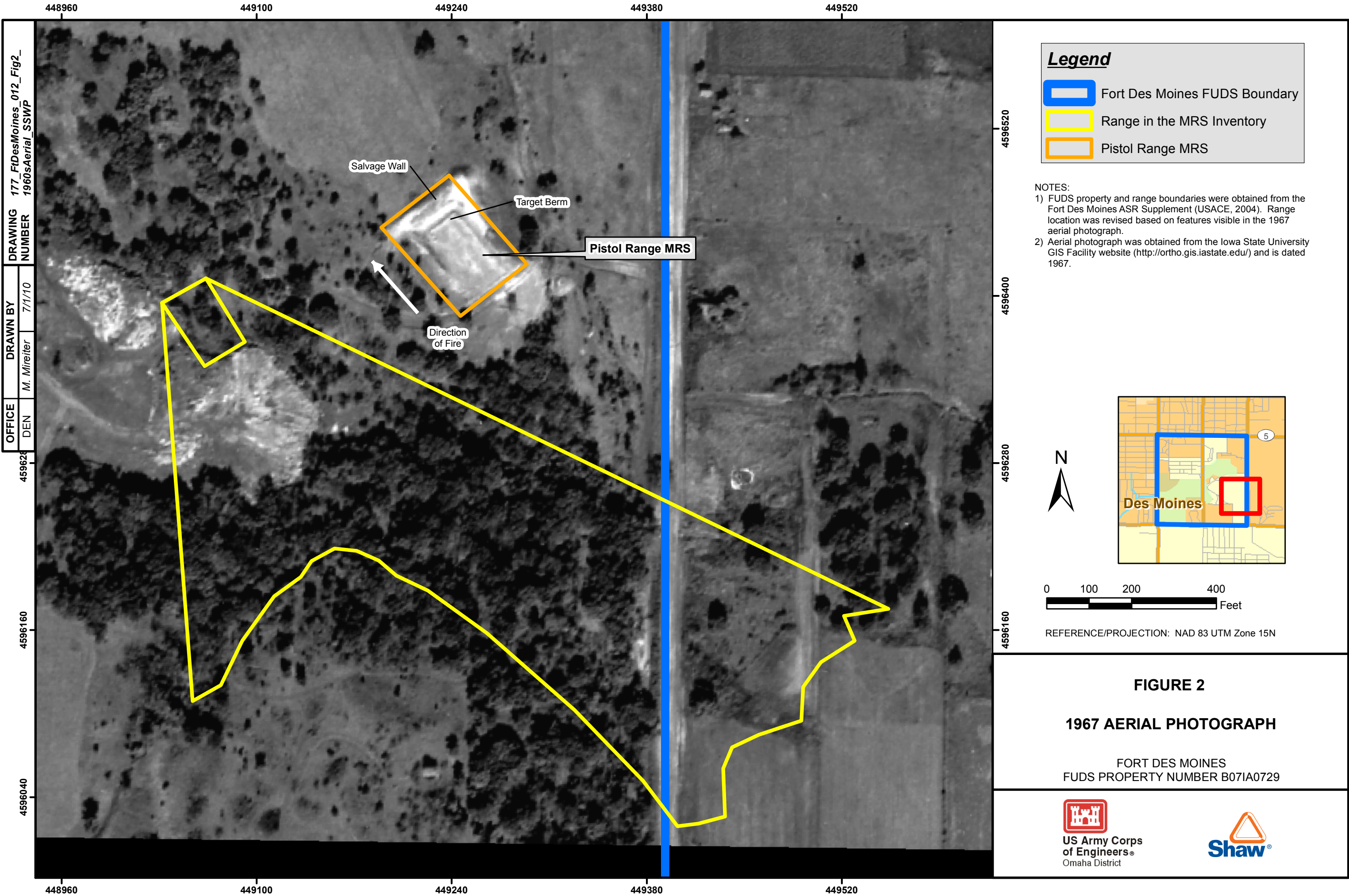


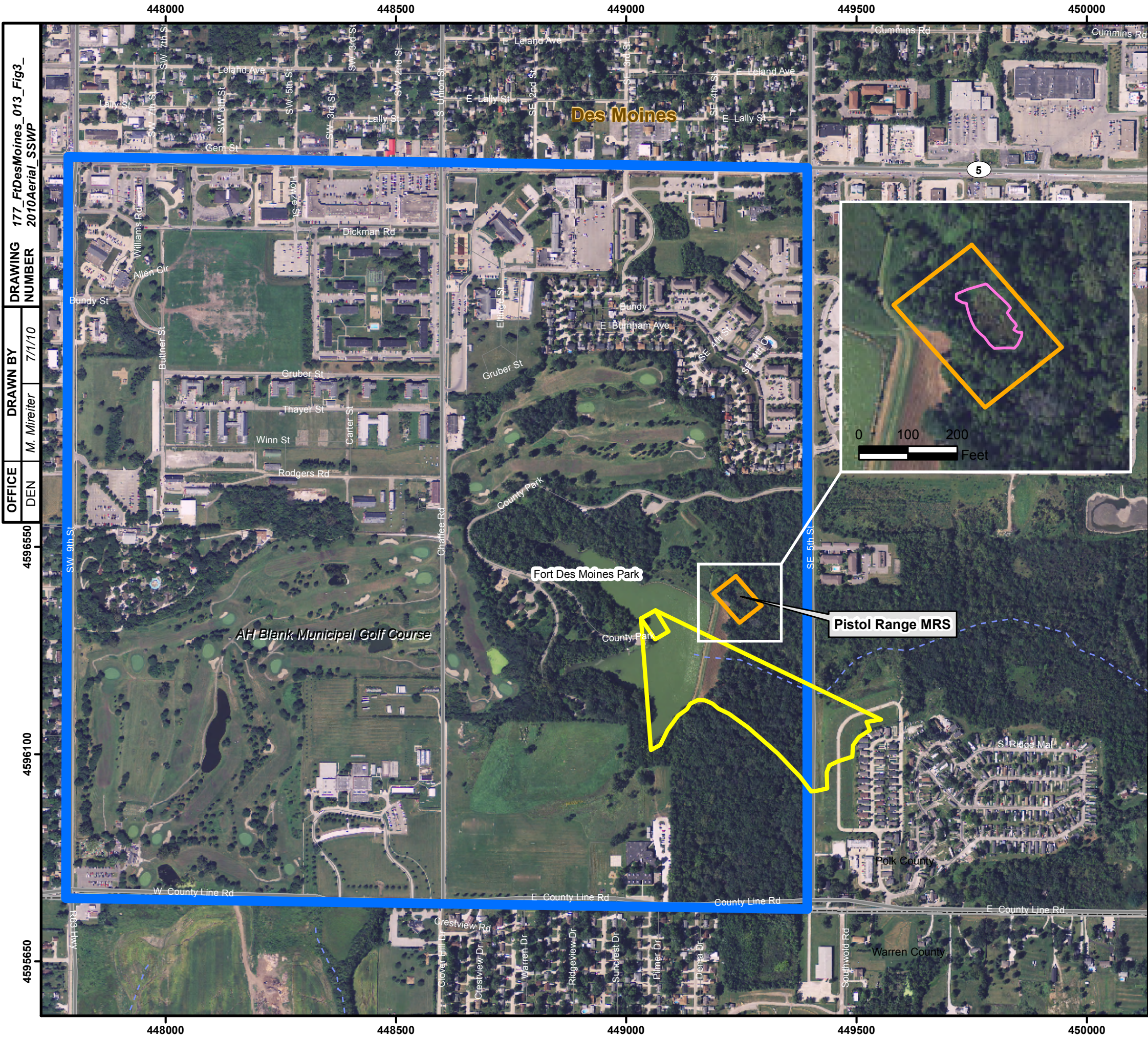
REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 1**  
**SITE LOCATION**

FORT DES MOINES  
FUDS PROPERTY NUMBER B07IA0729







DRAWING NUMBER 177\_FtDesMoines\_013\_Fig3\_2010Aerial\_SSWP

DRAWN BY M. Mireiter 7/1/10

OFFICE DEN

4596550

4596100

4595650

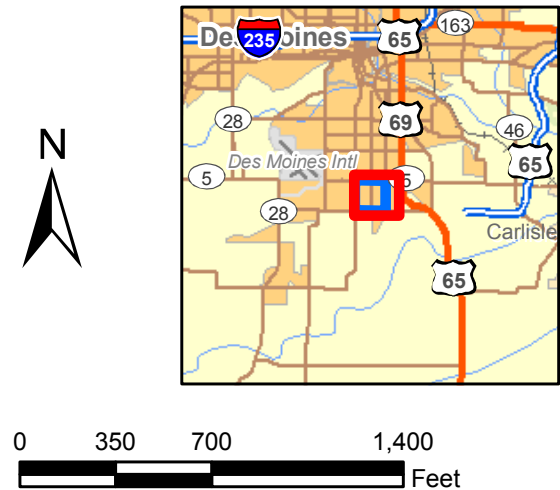
**Legend**

- Fort Des Moines FUDS Boundary
- Range in the MRS Inventory
- Pistol Range MRS
- Wetlands Area

NOTES:

1) FUDS property and range boundaries were obtained from the Fort Des Moines ASR Supplement (USACE, 2004). Range location was revised based on features visible in the 1967 aerial photograph.

2) Aerial photograph (Polk County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.



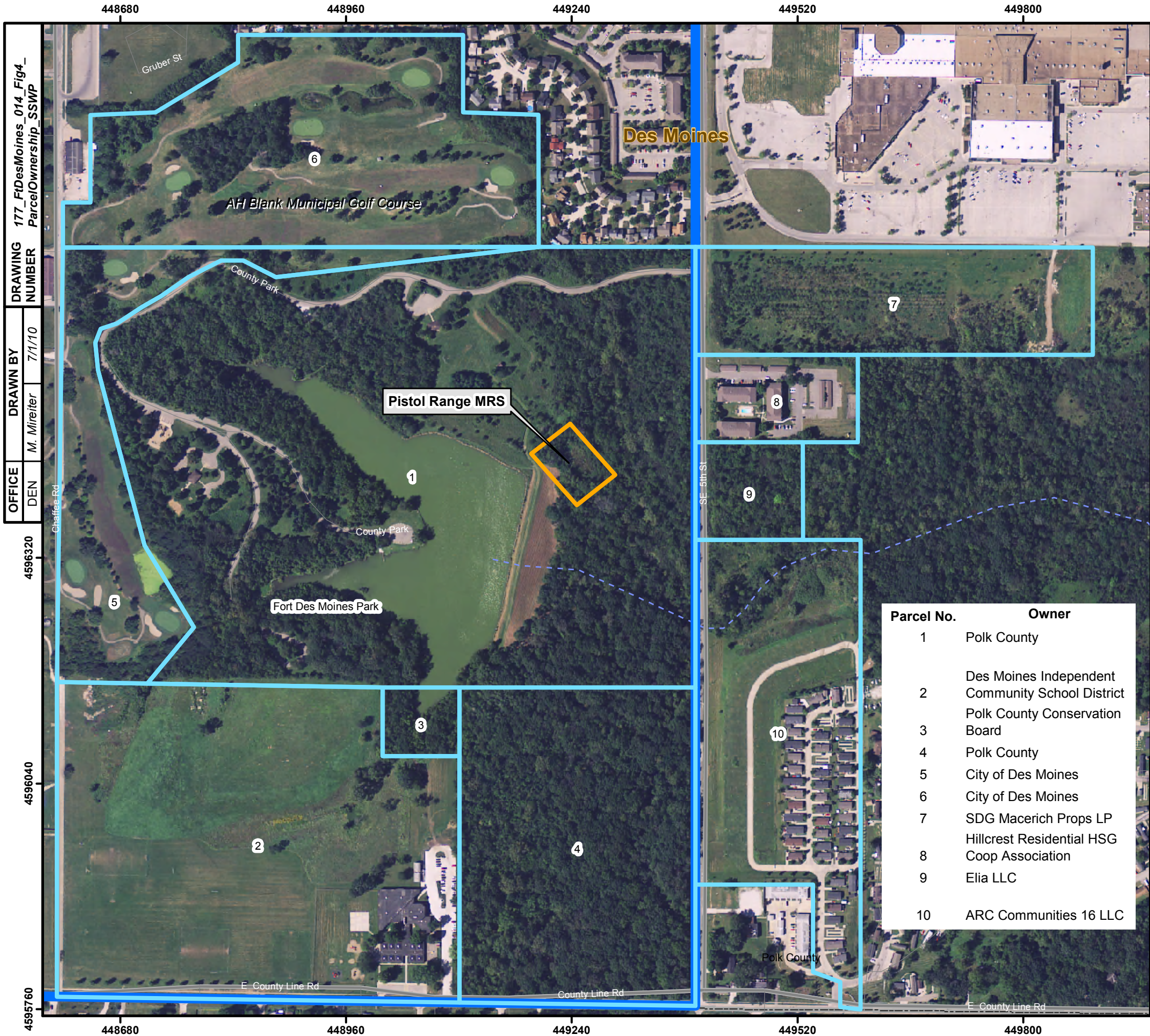
REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 3**

**2010 AERIAL PHOTOGRAPH**

FORT DES MOINES  
FUDS PROPERTY NUMBER B07IA0729

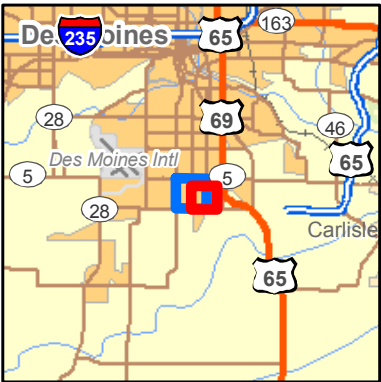




**Legend**

- Fort Des Moines FUDS Boundary
- Taxlot Parcel
- Pistol Range MRS

- NOTES:
- FUDS property and range boundaries were obtained from the Fort Des Moines ASR Supplement (USACE, 2004). Range location was revised based on features visible in the 1967 aerial photograph.
  - Parcel data was obtained from the Polk County Assessor's website (<http://www.assess.co.polk.ia.us/>).
  - Aerial photograph (Polk County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.



0 200 400 800  
Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 4**

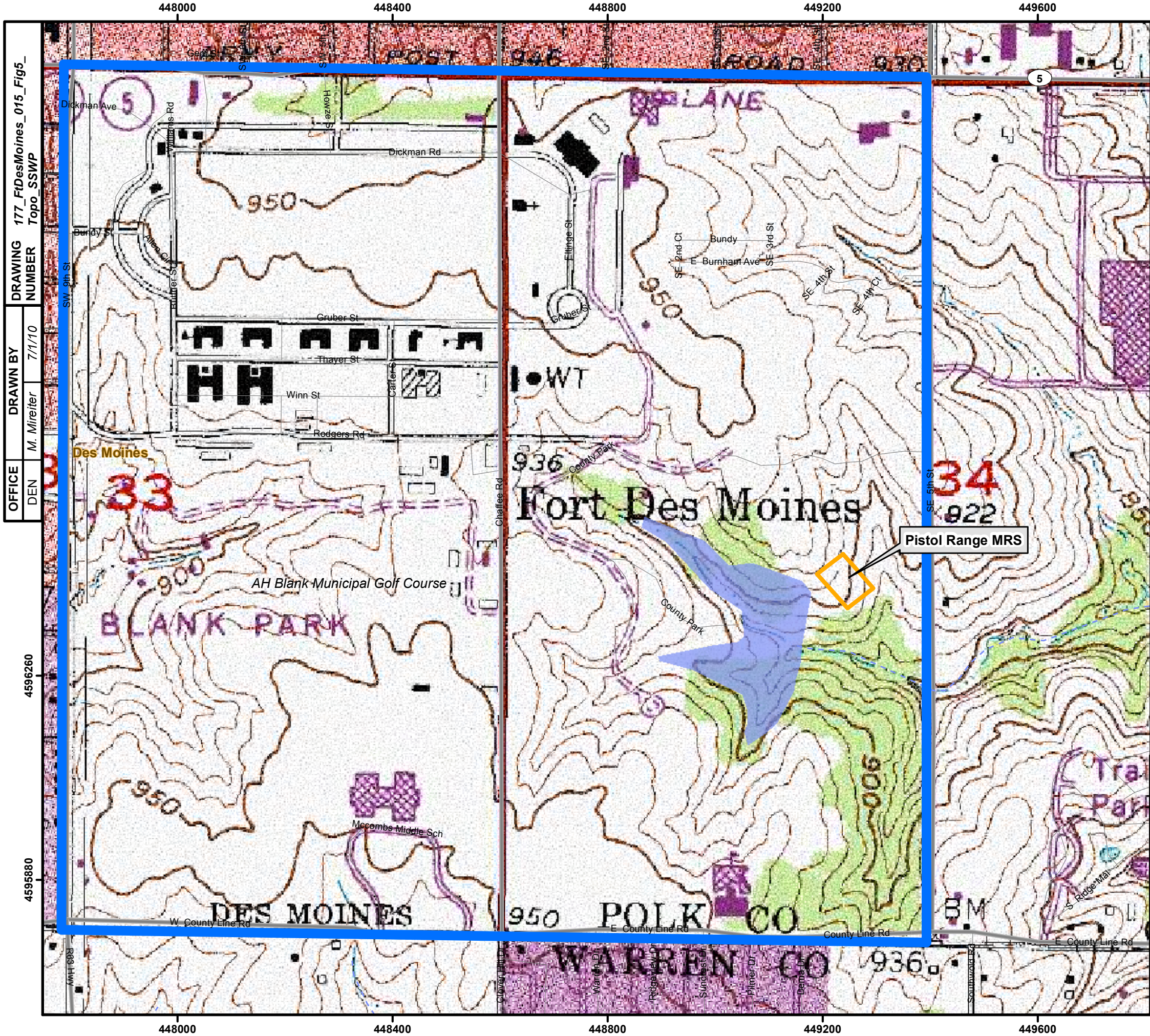
**PARCEL OWNERSHIP**

FORT DES MOINES  
FUDS PROPERTY NUMBER B07IA0729



US Army Corps  
of Engineers®  
Omaha District



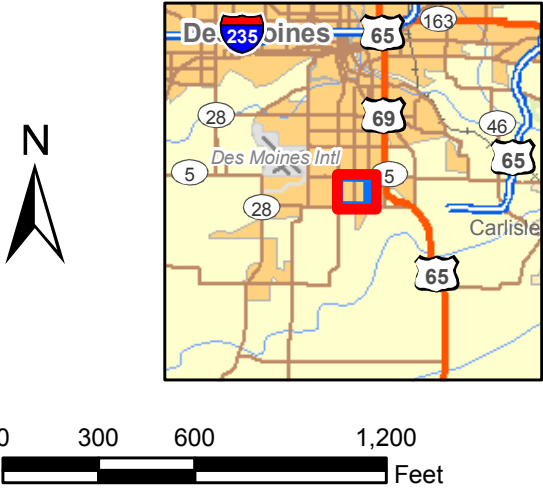


**Legend**

- Fort Des Moines FUDS Boundary
- Pistol Range MRS

NOTES:

- 1) FUDS property and range boundaries were obtained from the Fort Des Moines ASR Supplement (USACE, 2004). Range location was revised based on features visible in the 1967 aerial photograph.
- 2) Topographic map (Polk County) was obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.

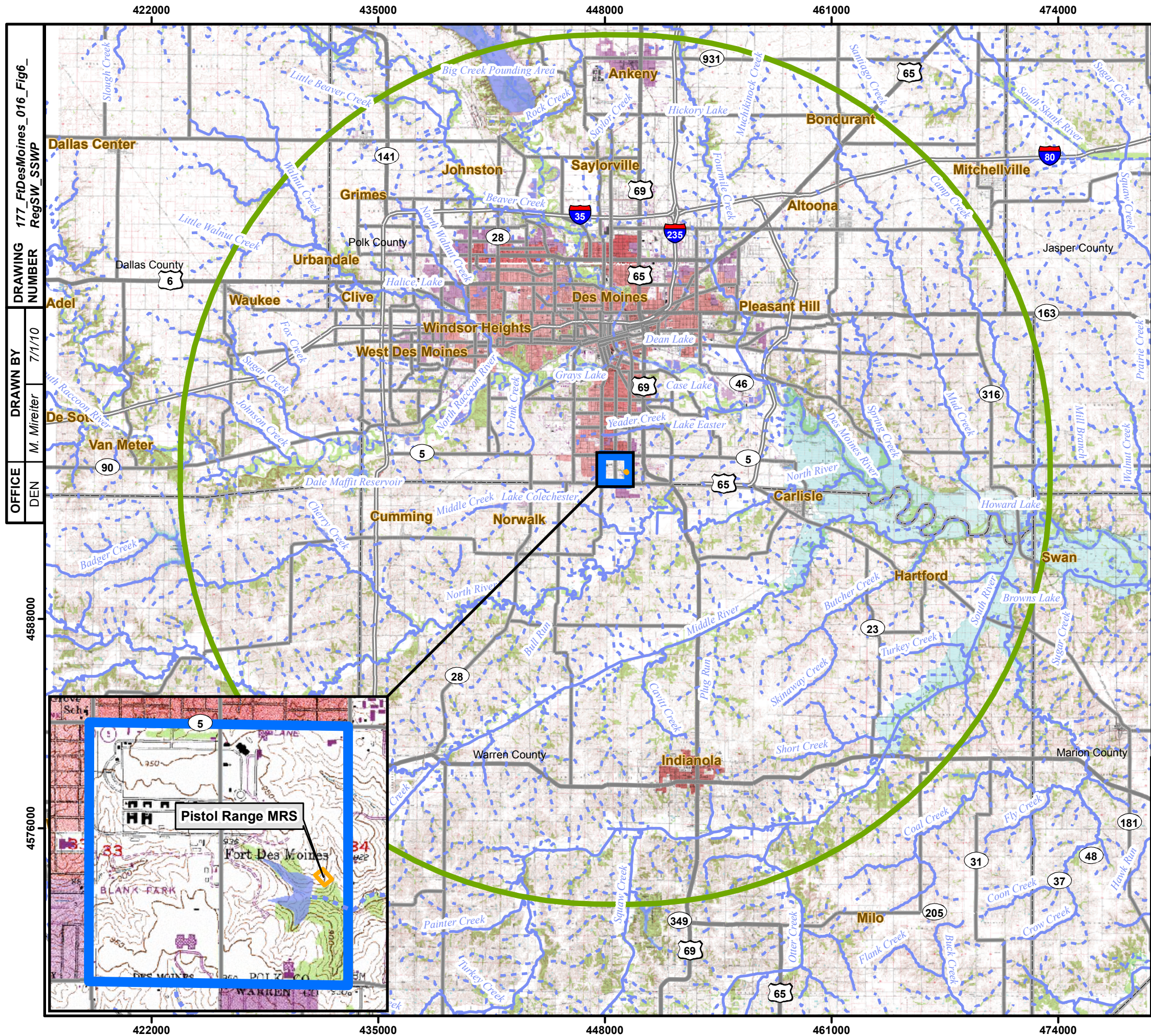


REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 5**  
**TOPOGRAPHIC MAP**

FORT DES MOINES  
FUDS PROPERTY NUMBER B07IA0729



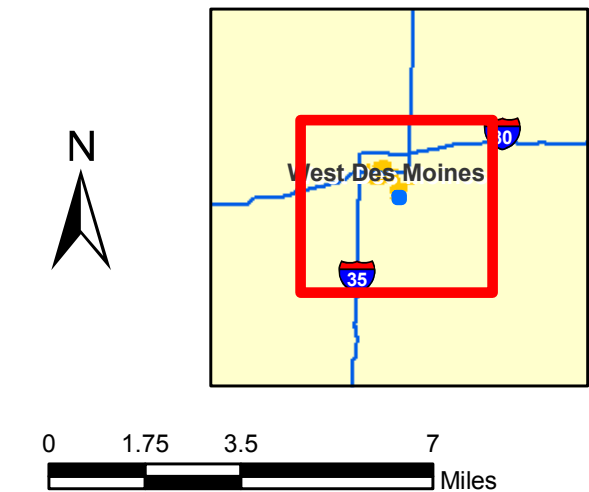


**Legend**

- Fort Des Moines FUDS Boundary
- 15-Mile Radius from FUDS Boundary
- Pistol Range MRS
- Intermittent Stream
- Perennial Stream

NOTES:

- 1) FUDS property and range boundaries were obtained from the Fort Des Moines ASR Supplement (USACE, 2004). Range location was revised based on features visible in the 1967 aerial photograph.
- 2) Topographic maps (Polk and Warren Counties) were obtained from the U. S. Department of Agriculture, Service Center Agencies, 1999.

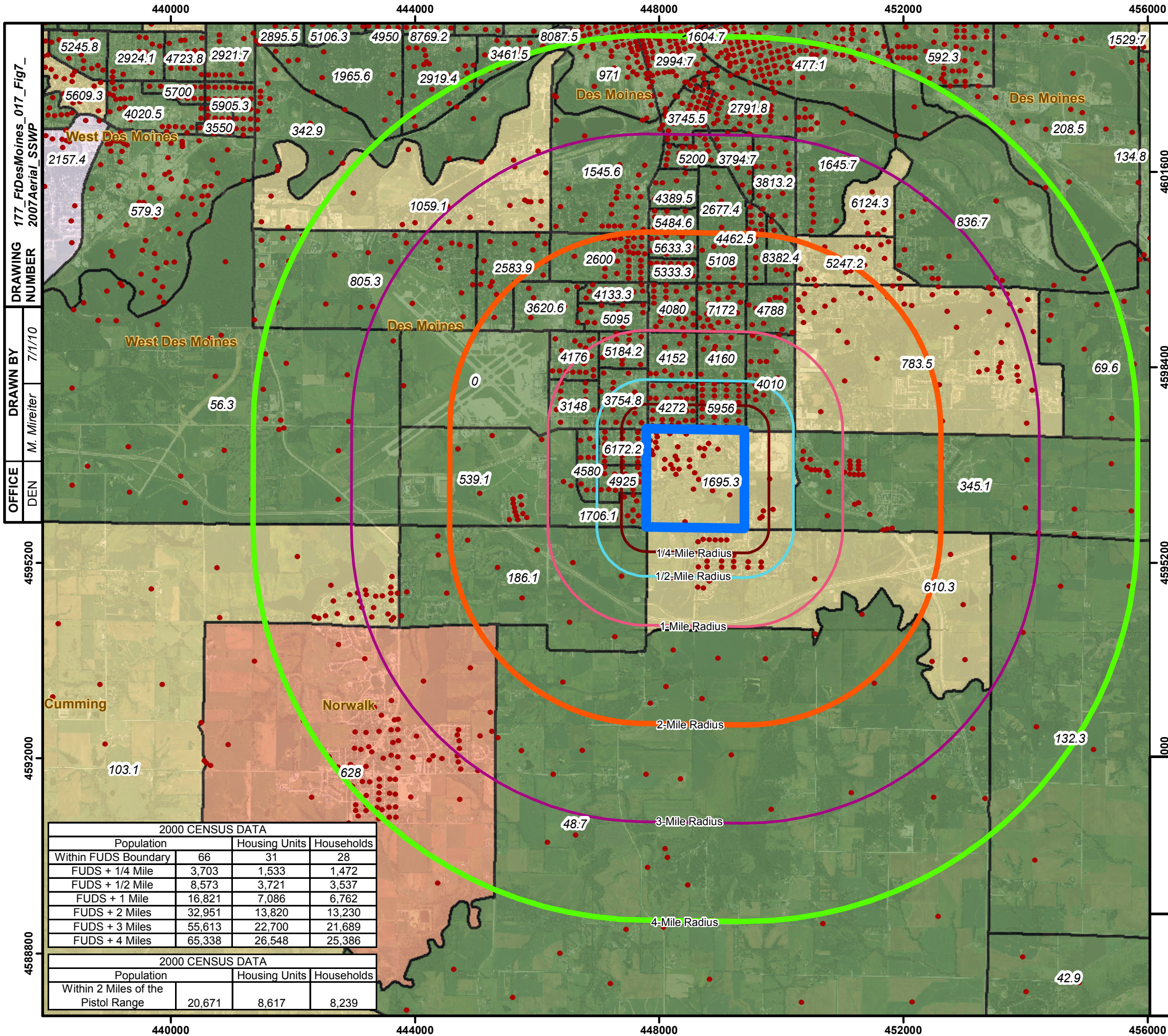


REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 6**  
**REGIONAL SURFACE WATER DRAINAGE**  
**WITHIN A 15-MILE RADIUS**

FORT DES MOINES  
FUDS PROPERTY NUMBER B07IA0729





**Legend**

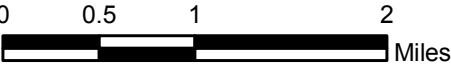
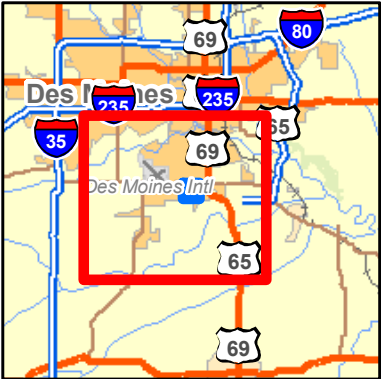
Fort Des Moines FUDS Boundary

**2005 Census Block Group Population**

- 0 - 2200
- 2201 - 4400
- 4401 - 6600
- 6601 - 8800
- Census Block Centroid Unit
- Number of People Per Square Mile Within Census Block Group

NOTES:

- 1) FUDS property boundary was obtained from the Fort Des Moines ASR Supplement (USACE, 2004).
- 2) Census data were obtained from StreetMap (ESRI, 2006).
- 3) The 2005 population of Polk County was 681.8 people per square mile.
- 4) The Census Block Centroid Units represent centroids of the smallest entities for which the Census Bureau tabulates census information, bounded on all sides by visible features such as streets, streams, and railroad tracks, and/or invisible boundaries such as city, town, and county limits. The population assigned to a centroid unit may be a positive integer or zero. The centroid populations were summed within defined distances from the FUDS boundary to generate population totals presented on the inset table.
- 5) Aerial photographs (Polk and Warren Counties) were obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.



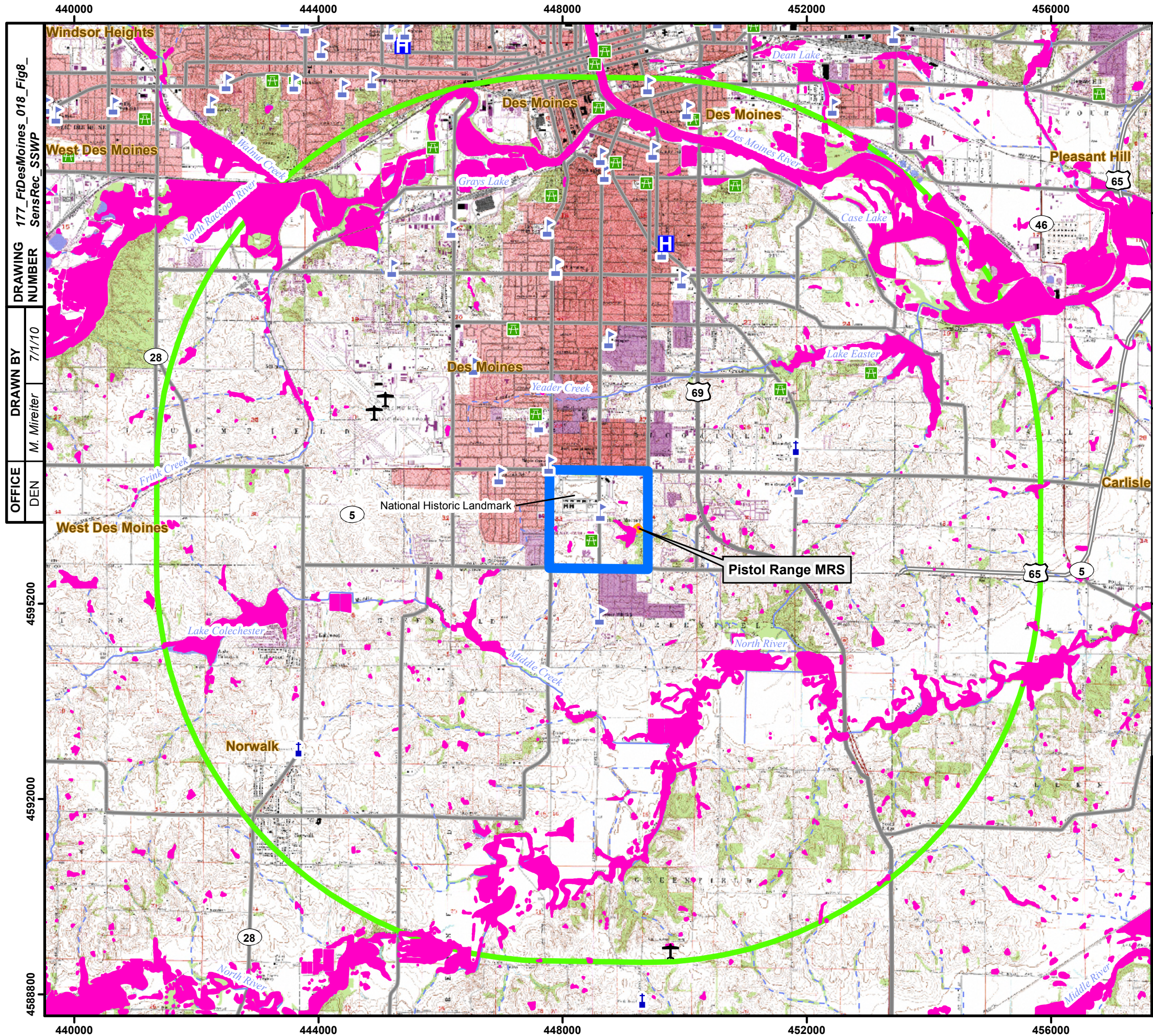
REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 7**

**CENSUS DATA WITHIN A 4-MILE RADIUS**

FORT DES MOINES  
FUDS PROPERTY NUMBER B07IA0729





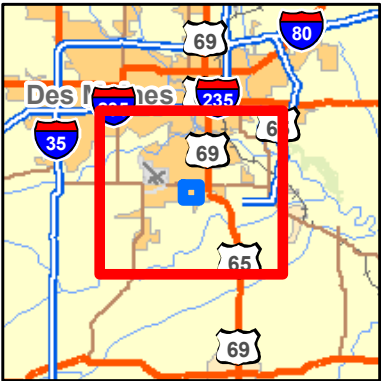
DRAWING NUMBER 177\_FtDesMoines\_018\_Fig8\_  
DRAWN BY M. Mireiter  
OFFICE DEN 7/1/10

### Legend

- Fort Des Moines FUDS Boundary
- 4-Mile Radius from FUDS Boundary
- Pistol Range MRS
- Wetlands Area
- Airport
- Church
- Hospital
- Park
- School

### NOTES:

- 1) FUDS property and range boundaries were obtained from the Fort Des Moines ASR Supplement (USACE, 2004). Range location was revised based on features visible in the 1967 aerial photograph.
- 2) Wetlands data was obtained from the U.S. Fish and Wildlife Service, May 2006, NWIDBA.CONUS\_wet\_poly: Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31., U.S. Fish and Wildlife Service, Branch of Habitat Assessment, Washington, D.C.
- 3) Topographic map (Polk County) was obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.



0 0.5 1 2 Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

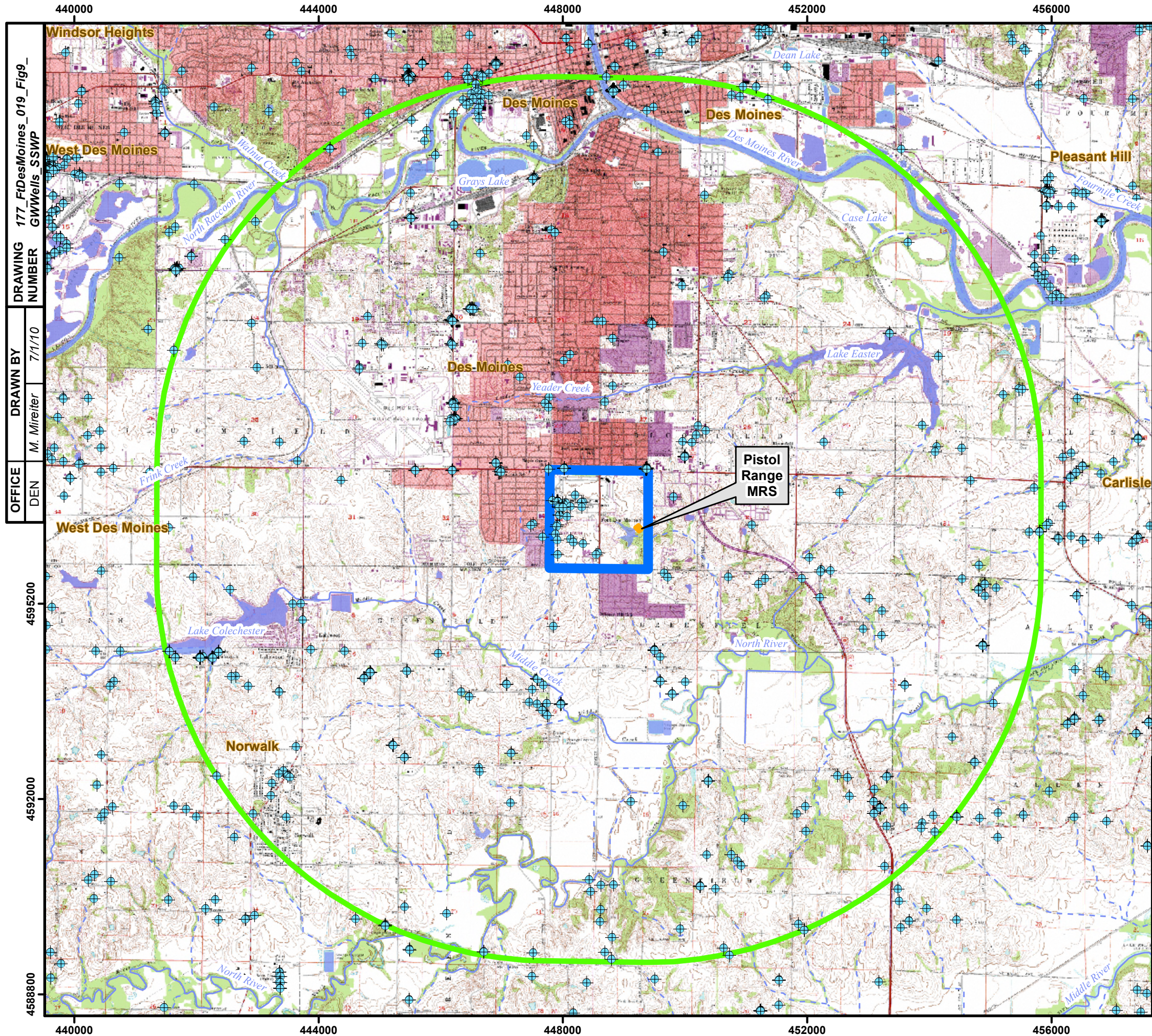
## FIGURE 8 SENSITIVE RECEPTOR LOCATIONS WITHIN A 4-MILE RADIUS

FORT DES MOINES  
FUDS PROPERTY NUMBER B07IA0729



US Army Corps  
of Engineers®  
Omaha District





**Legend**

Fort Des Moines FUDS Boundary

4-Mile Radius from FUDS Boundary

Pistol Range MRS

Groundwater Well Location

NOTES:

1) FUDS property and range boundaries were obtained from the Fort Des Moines ASR Supplement (USACE, 2004). Range location was revised based on features visible in the 1967 aerial photograph.

2) Groundwater well data was obtained from the Iowa Geological Survey, Natural Resources GIS Library website: <http://www.igsb.uiowa.edu/nrgislibx/>.

3) Topographic map (Polk County) was obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.

N

00.512

Miles

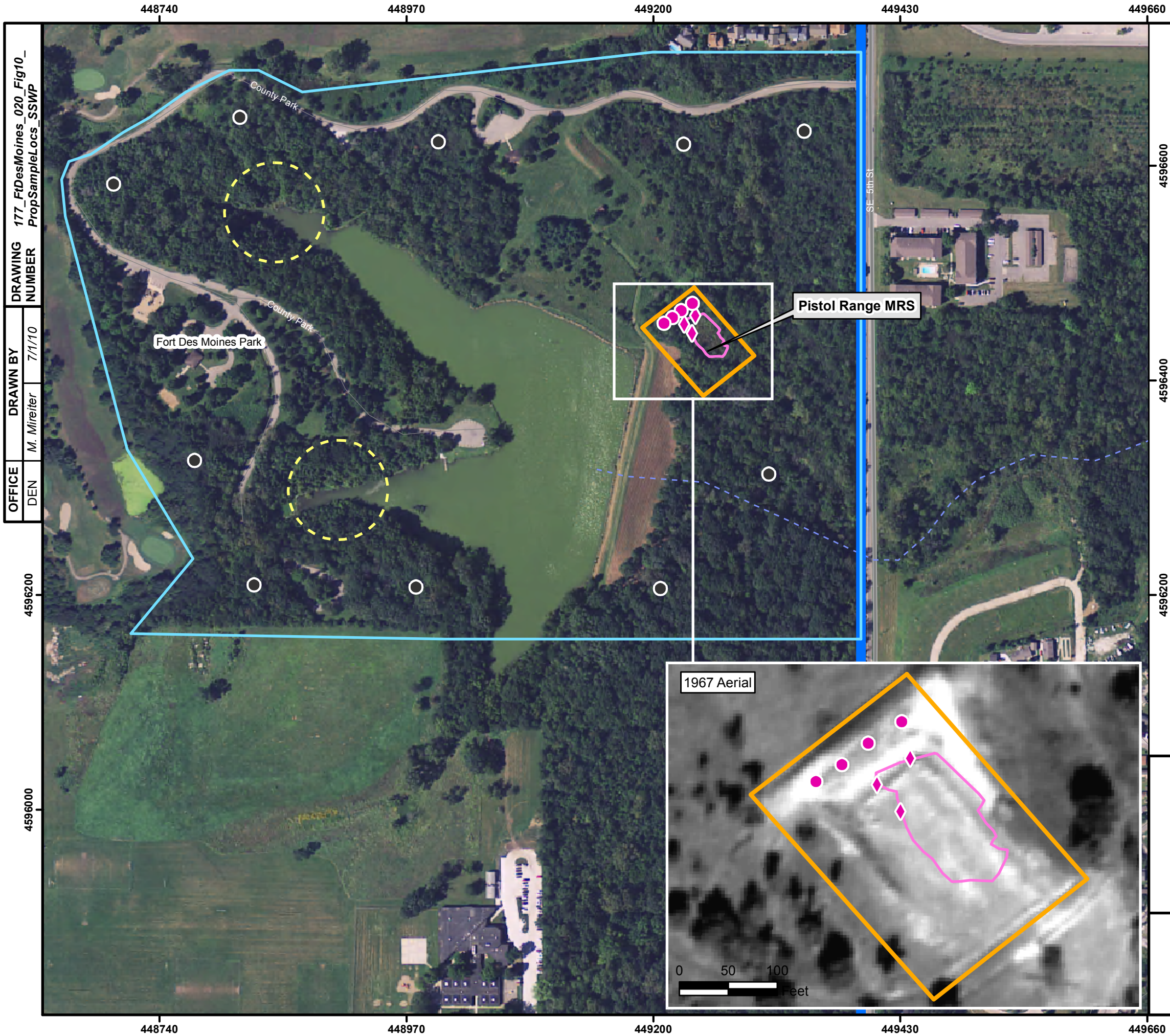
REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 9**

**GROUNDWATER WELL LOCATIONS  
WITHIN A 4-MILE RADIUS**

FORT DES MOINES  
FUDS PROPERTY NUMBER B071A0729

US Army Corps  
of Engineers®  
Omaha District



**Legend**

Fort Des Moines FUDS Boundary

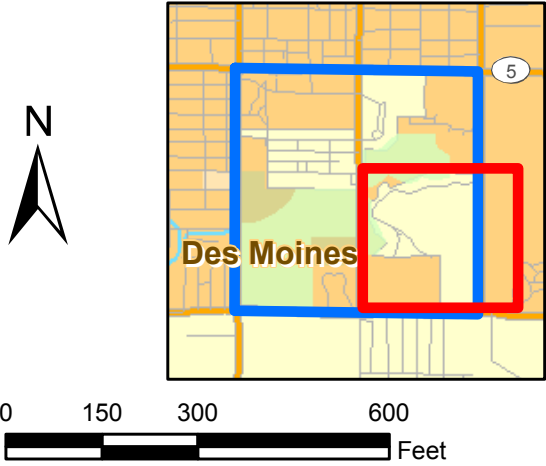
Pistol Range MRS**Proposed Sample Locations**Sediment/Surface WaterSoilBackground SoilGeneral Area in which 1 Background Sediment/Surface Water Sample will be Collected

NOTES:

1) FUDS property and range boundaries were obtained from the Fort Des Moines ASR Supplement (USACE, 2004). Range location was revised based on features visible in the 1967 aerial photograph.

2) Main data frame aerial photograph (Polk County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.

3) Inset aerial photograph was obtained from the Iowa State University GIS Facility website (<http://ortho.gis.iastate.edu/>) and is dated 1967.



REFERENCE/PROJECTION: NAD 83 UTM Zone 15N

**FIGURE 10**

**PROPOSED SAMPLE LOCATIONS**

FORT DES MOINES  
FUDS PROPERTY NUMBER B071A0729



## *Tables*

**Table 1**  
**Munitions Information**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| <b>Small Arms Munitions</b>  | <b>Component</b>       | <b>Munitions Constituents *</b>                   | <b>Site Inspection Analytes</b> |
|--|------------------------|---|---------------------------------|
| Pistol calibers:<br>.22, .38 and .45<br><br>Probable rifle caliber:<br>.30-caliber | Projectile             | Lead, antimony, copper, zinc, nickel , iron       | Lead, antimony, copper, zinc    |
|  | Cartridge Case (brass) | Copper, zinc                                      | Copper, zinc                    |
|  | Propellant             | Nitrocellulose, nitroglycerin, 2,4-dinitrotoluene | None                            |
|  | Primer                 | Potassium, lead, antimony, barium, calcium, PETN  | None                            |

**Notes:**

PETN = pentaerythritol tetranitrate.

\* The basis for excluding various constituents from the site inspection analytes is summarized as follows. Four metallic constituents are Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances and are appropriate indicator analytes for analysis (lead, antimony, copper, and zinc). Other metals are non-hazardous (e.g., iron), minor constituents with limited potential quantities (nickel, a possible minor constituent of projectile jacketing), or are both non-hazardous and involve limited potential quantities (e.g., barium, calcium, magnesium, potassium, and other components). Primer and propellant are largely dispersed in the air upon firing and involve limited potential quantities.

**Table 2**  
**Sample Location Rationale**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| <b>MRS / Background</b>                                 | <b>Sample Location</b> | <b>Sample Media</b> | <b>Sample Location Rationale</b>   |
|---|------------------------|---------------------|--|
| Pistol Range MRS - earthen salvage wall (lower portion) | 177A001                | Surface Soil        | Four surface soil samples will be collected from the lower portion of the earthen salvage wall that is located behind the target area.   |
|   | 177A002                | Surface Soil        |  |
|   | 177A003                | Surface Soil        |  |
|   | 177A004                | Surface Soil        |  |
| Pistol Range MRS - wetland area nearest salvage wall    | 177A005                | Sediment            | Three collocated sediment/surface water sample pairs will be collected from the northern portion of the emergent wetland that is nearest to the base of the salvage wall.  |
|   |                        | Surface Water       |  |
|   | 177A006                | Sediment            | Surface water will be collected only if the field crew determines that the water is pooled above the ground's surface sufficient to collect viable samples. If collected, surface water samples will be collected as both total (unfiltered) and dissolved (filtered) samples. Sediment samples will be collected regardless of the collection of a collocated surface water sample.   |
|   |                        | Surface Water       |  |
|   | 177A007                | Sediment            |  |
|   |                        | Surface Water       |  |
| Background  | 177A008 thru 177A017   | Surface Soil        | Ten background surface soil samples will be collected outside the MRS in an undisturbed area not expected to be impacted from prior military activities to establish a baseline for metals of concern.   |
|   | 177A018                | Sediment            | One collocated sediment/surface water sample pair will be collected outside the MRS from one of two possible upslope areas at the headwaters of the adjacent 13-acre lake in Fort Des Moines Park. The field crew will inspect both areas and determine the more suitable location. In the event surface water samples are not collected at the MRS, a background surface water sample will not be collected. A background sediment sample will be collected regardless. |
|   |                        | Surface Water       |  |

**Table 3**  
**Sample Designations, Quality Assurance/Quality Control, and Analyses**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| MRS /<br>Background  | Sample<br>Location | Sample<br>Type   | Sample<br>Number | Sample<br>Media | Quality Assurance/Quality Control<br>Samples |        | Analysis/U.S. Environmental<br>Protection Agency (EPA)<br>Method   |
|--|--------------------|------------------|------------------|-----------------|--|--------|--|
|  |                    |                  |                  |                 | Field Duplicate                              | MS/MSD |  |
| Pistol Range<br>MRS - earthen<br>salvage wall<br>(lower portion) | 177A001            | Composite        | NWO-177-0001     | Surface Soil    | NWO-177-0005                                 |        | Antimony, copper, lead, manganese,<br>and zinc by SW-846 6020<br><br>Aluminum, calcium, iron, and<br>magnesium by SW-846 6010B |
|  | 177A002            | Composite        | NWO-177-0002     | Surface Soil    |  |        |  |
|  | 177A003            | Composite        | NWO-177-0003     | Surface Soil    |  |        |  |
|  | 177A004            | Composite        | NWO-177-0004     | Surface Soil    |  |        |  |
| Pistol Range<br>MRS - wetland<br>area nearest<br>salvage wall    | 177A005            | Discrete<br>Grab | NWO-177-1001     | Sediment        |  |        | Antimony, copper, lead, and zinc by<br>SW-846 6020   |
|  |                    | Discrete<br>Grab | NWO-177-2001     | Surface Water   |  |        | Total and dissolved antimony,<br>copper, lead, and zinc by<br>SW-846 6020  |
|  | 177A006            | Discrete<br>Grab | NWO-177-1002     | Sediment        |  |        | Antimony, copper, lead, and zinc by<br>SW-846 6020   |
|  |                    | Discrete<br>Grab | NWO-177-2002     | Surface Water   |  |        | Total and dissolved antimony,<br>copper, lead, and zinc by<br>SW-846 6020  |
|  | 177A007            | Discrete<br>Grab | NWO-177-1003     | Sediment        | NWO-177-1004                                 |        | Antimony, copper, lead, and zinc by<br>SW-846 6020   |
|  |                    | Discrete<br>Grab | NWO-177-2003     | Surface Water   | NWO-177-2004                                 |        | Total and dissolved antimony,<br>copper, lead, and zinc by<br>SW-846 6020  |

**Table 3 (Continued)**  
**Sample Designations, Quality Assurance/Quality Control, and Analyses**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| MRS /<br>Background | Sample<br>Location | Sample<br>Type   | Sample<br>Number | Sample<br>Media | Quality Assurance/Quality Control<br>Samples |                     | Analysis/U.S. Environmental<br>Protection Agency (EPA)<br>Method   |
|---------------------|--------------------|------------------|------------------|-----------------|--|---------------------|--|
|                     |                    |                  |                  |                 | Field Duplicate                              | MS/MSD              |  |
| Background          | 177A008            | Composite        | NWO-177-5001     | Surface Soil    |  | NWO-177-5001-MS/MSD | Aluminum, calcium, iron, and<br>magnesium by SW-846 6010B<br><br>Antimony, copper, lead, manganese,<br>and zinc by SW-846 6020 |
|                     | 177A009            | Composite        | NWO-177-5002     | Surface Soil    |  |                     |  |
|                     | 177A010            | Composite        | NWO-177-5003     | Surface Soil    |  |                     |  |
|                     | 177A011            | Composite        | NWO-177-5004     | Surface Soil    |  |                     |  |
|                     | 177A012            | Composite        | NWO-177-5005     | Surface Soil    |  |                     |  |
|                     | 177A013            | Composite        | NWO-177-5006     | Surface Soil    |  |                     |  |
|                     | 177A014            | Composite        | NWO-177-5007     | Surface Soil    |  |                     |  |
|                     | 177A015            | Composite        | NWO-177-5008     | Surface Soil    |  |                     |  |
|                     | 177A016            | Composite        | NWO-177-5009     | Surface Soil    |  |                     |  |
|                     | 177A017            | Composite        | NWO-177-5010     | Surface Soil    |  |                     |  |
|                     | 177A018            | Discrete<br>Grab | NWO-177-5011     | Sediment        |  |                     | Antimony, copper, lead, and zinc by<br>SW-846 6020   |
|                     |                    | Discrete<br>Grab | NWO-177-6001     | Surface Water   |  | NWO-177-6001-MS/MSD | Total and dissolved antimony,<br>copper, lead, and zinc by<br>SW-846 6020  |

**Notes:**

MRS = munitions response site

MS/MSD denotes matrix spike/matrix spike duplicate

Antimony, copper, lead, and zinc are the Munitions Constituents of concern.

Aluminum, calcium, iron, magnesium, and manganese are analyzed for potential geochemical evaluation for soil samples only.

Surface soil samples are composite samples (7-point, wheel pattern with 2-foot radius). All other samples are discrete grab samples.

All soil and sediment samples are sieved through a No. 10 sieve at the lab.

**Table 4**  
**Human Health Screening Criteria for Soil and Sediment**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| Analyte of Concern<br>(Symbol) | CAS No.   | Laboratory<br>PQL<br>(mg/kg) | Laboratory<br>MDL<br>(mg/kg) | Iowa DNR<br>Statewide Soil<br>Standards <sup>a</sup><br>(mg/kg) | EPA Regional<br>Screening Levels<br>Residential Soil <sup>b</sup><br>(mg/kg) | Proposed Human<br>Health Screening<br>Value<br>(mg/kg) |
|--------------------------------|-----------|------------------------------|------------------------------|---|--|--|
| Antimony (Sb)                  | 7440-36-0 | 1.0                          | 0.13                         | 31  | 31   | 31   |
| Copper (Cu)                    | 7440-50-8 | 2.0                          | 0.15                         | NVA   | 3,100  | 3,100  |
| Lead (Pb)                      | 7439-92-1 | 2.0                          | 0.12                         | 400   | 400  | 400  |
| Zinc (Zn)                      | 7440-66-6 | 10.0                         | 0.7                          | 23,000  | 23,000   | 23,000   |

**Notes:**

EPA = U.S. Environmental Protection Agency

DNR = Department of Natural Resources

MDL = Method Detection Limit

MRS = Munitions Response Site

mg/kg = milligram(s) per kilogram

NVA = No Value Available

PQL = Practical Quantitation Limit

<sup>a</sup> Iowa DNR. 2011. Statewide Standards for Contaminants. Website: <https://programs.iowadnr.gov/riskcalc/pages/standards.aspx>. Queried January 2011.

<sup>b</sup> EPA. 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites, November 2010. Website: <http://www.epa.gov/reg3hwmd/risk/human/index.htm>. Queried January 2011.

If the laboratory cannot meet any of the PQLs with routine SW-846 methodology (as supported by MDLs that are no greater than 1/3 PQL), the laboratory's PQL must be identified in laboratory submittal as failing to meet the PQL. Some screening values cannot be obtained with routine methodology to the PQL. In those cases, the PQL achievable with a routine SW-846 methodology would be accepted.

**Table 5**  
**Human Health Screening Criteria for Surface Water**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| Analyte of Concern<br>(Symbol) | CAS No.   | Laboratory<br>PQL<br>(µg/L) | Laboratory<br>MDL<br>(µg/L) | Iowa DNR<br>Human Health<br>Screening Value <sup>a</sup><br>(µg /L) | EPA Regional<br>Screening Levels<br>MCL <sup>b</sup><br>(µg/L) | Proposed Human<br>Health Screening<br>Value<br>(µg/L) |
|--------------------------------|-----------|-----------------------------|-----------------------------|---|--|---|
| Antimony (Sb)                  | 7440-36-0 | 1.0                         | 0.15                        | 5.6   | 6.0  | 5.6   |
| Copper (Cu)                    | 7440-50-8 | 2.0                         | 0.31                        | 1,300   | 1,300  | 1,300   |
| Lead (Pb)                      | 7439-92-1 | 2.0                         | 0.093                       | NVA   | 15   | 15  |
| Zinc (Zn)                      | 7440-66-6 | 10.0                        | 2.3                         | 7,400   | 11,000   | 7,400   |

**Notes:**

DNR = Department of Natural Resources  
EPA = U.S. Environmental Protection Agency  
MCL = Maximum Contaminant Level.  
MDL = Method Detection Limit  
MRS = Munitions Response Site  
µg/L = microgram(s) per liter  
NVA = No Value Available  
PQL = Practical Quantitation Limit

<sup>a</sup> Iowa Final Rule: ARC 6352B – Chemical Criteria – Effective November 28, 2007, Human Health Criteria. All criteria are “total recoverable.”

<sup>b</sup> EPA. 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites. November 2010. Website:  
[http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/). Lower value of the MCL and tap water screening level presented.

If the laboratory cannot meet any of the PQLs with routine SW-846 methodology (as supported by MDLs that are no greater than 1/3 PQL), the laboratory's PQL must be identified in laboratory submittal as failing to meet the PQL. Some screening values cannot be obtained with routine methodology to the PQL. In those cases the PQL achievable with a routine SW-846 methodology would be accepted.

**Table 6**  
**Ecological Screening Criteria for Soil**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| Analyte of Concern<br>(Symbol) | CAS No.   | Laboratory<br>PQL<br>(mg/kg) | Laboratory<br>MDL<br>(mg/kg) | EPA EcoSSL<br>(mg/kg) <sup>a</sup> | LANL<br>Soil ESL <sup>b</sup><br>(mg/kg) | ORNL Soil<br>PRG <sup>c</sup><br>(mg/kg) | Proposed Soil<br>ESV <sup>d</sup><br>(mg/kg) |
|--------------------------------|-----------|------------------------------|------------------------------|------------------------------------|--|--|--|
| Antimony (Sb)                  | 7440-36-0 | 1.0                          | 0.13                         | 0.27                               | NVA                                      | 5  | 0.27   |
| Copper (Cu)                    | 7440-50-8 | 2.0                          | 0.15                         | 28                                 | 15                                       | 60                                       | 28   |
| Lead (Pb)                      | 7439-92-1 | 2.0                          | 0.12                         | 11                                 | 14                                       | 40.5                                     | 11   |
| Zinc (Zn)                      | 7440-66-6 | 10.0                         | 0.7                          | 46                                 | 48                                       | 8.5                                      | 46   |

**Notes:**

EcoSSL = Ecological Soil Screening Level  
EPA = U.S. Environmental Protection Agency  
ESL = Ecological Screening Level  
ESV = Ecological Screening Value  
LANL = Los Alamos National Laboratory  
MDL = Method Detection Limit  
mg/kg = milligram(s) per kilogram  
MRS = Munitions Response Site  
NVA = No Value Available

ORNL = Oak Ridge National Laboratory  
PQL = Practical Quantitation Limit  
PRG = Preliminary Remediation Goals

<sup>a</sup> EPA. 2007. Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Office of Solid Waste and Emergency Response, Website version last updated April 2007: <http://www.epa.gov/ecotox/ecossl>.

<sup>b</sup> Los Alamos National Laboratory (LANL). 2010. Los Alamos National Laboratory Ecorisk Database, Release 2.5. Wildlife values.

<sup>c</sup> Oak Ridge National Laboratory (ORNL). 1997. Preliminary Remediation Goals (PRG) for Ecological Endpoints for Sediment, ES/ER/TM-162/R2.

<sup>d</sup> The following hierarchy was used: 1) EPA EcoSSL, 2) LANL ESL, and 3) ORNL PRG.

If the laboratory cannot meet any of the PQLs with routine SW-846 methodology (as supported by MDLs that are no greater than 1/3 PQL), the laboratory's PQL must be identified in laboratory submittal as failing to meet the PQL. Some screening values cannot be obtained with routine methodology to the PQL. In those cases, the PQL achievable with a routine SW-846 methodology would be accepted.

**Table 7**  
**Ecological Screening Criteria for Sediment**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| Analyte of Concern<br>(Symbol) | CAS No.   | Laboratory PQL<br>(mg/kg) | Laboratory MDL<br>(mg/kg) | MacDonald, et al., 2003 <sup>a</sup><br>(mg/kg) | LANL Sediment ESL <sup>b</sup><br>(mg/kg) | ORNL Sediment PRG <sup>c</sup><br>(mg/kg) | Proposed Sediment ESV <sup>d</sup><br>(mg/kg) |
|--------------------------------|-----------|---------------------------|---------------------------|---|---|---|---|
| Antimony (Sb)                  | 7440-36-0 | 1.0                       | 0.13                      | NVA   | 0.36                                      | NVA                                       | 0.36  |
| Copper (Cu)                    | 7440-50-8 | 2.0                       | 0.15                      | 31.6  | 23  | 77.7                                      | 31.6  |
| Lead (Pb)                      | 7439-92-1 | 2.0                       | 0.12                      | 35.8  | 27  | 110                                       | 35.8  |
| Zinc (Zn)                      | 7440-66-6 | 10.0                      | 0.7                       | 121   | 65  | 270                                       | 121   |

**Notes:**

ESL = Ecological Screening Level  
ESV = Ecological Screening Value  
LANL = Los Alamos National Laboratory  
MDL = Method Detection Limit  
mg/kg = milligram(s) per kilogram  
MRS = Munitions Response Site  
NVA = No Value Available  
PQL = Practical Quantitation Limit  
PRG = Preliminary Remediation Goals

<sup>a</sup> MacDonald, D.D, C.G. Ingersoll, D.E. Smorong, R.A. Lindscoog, G. Sloane and T. Biernacki, 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection Technical Report. Consensus-based threshold effect concentrations.

<sup>b</sup> Los Alamos National Laboratory (LANL). 2010. Los Alamos National Laboratory Ecorisk Database, Release 2.5. Wildlife values.

<sup>c</sup> Oak Ridge National Laboratory (ORNL). 1997. Preliminary Remediation Goals for Ecological Endpoints for Sediment, ES/ER/TM-162/R2.

<sup>d</sup> The following hierarchy was used: 1) MacDonald et al., 2) LANL ESL, and 3) ORNL PRG.

If the laboratory cannot meet any of the PQLs with routine SW-846 methodology (as supported by MDLs that are no greater than 1/3 PQL), the laboratory's PQL must be identified in laboratory submittal as failing to meet the PQL. Some screening values cannot be obtained with routine methodology to the PQL. In those cases, the PQL achievable with a routine SW-846 methodology would be accepted.

**Table 8**  
**Ecological Screening Criteria for Surface Water**  
**Fort Des Moines, Iowa**  
**Pistol Range MRS**

| Analyte of Concern<br>(Symbol) | CAS No.   | Laboratory PQL<br>(µg/L) | Laboratory MDL<br>(µg/L) | Iowa DNR Aquatic Life Screening Value <sup>a</sup><br>(µg /L) | EPA NAWQC <sup>b</sup><br>(µg/L) | LANL Surface Water ESL <sup>c</sup><br>(µg/L) | ORNL Surface Water PRG <sup>d</sup><br>(µg/L) | Proposed ESV for Surface Water <sup>e</sup><br>(µg/L) |
|--------------------------------|-----------|--------------------------|--------------------------|---|----------------------------------|---|---|---|
| Antimony (Sb)                  | 7440-36-0 | 1.0                      | 0.15                     | NVA   | NVA                              | 100   | 30  | 100   |
| Copper (Cu)                    | 7440-50-8 | 2.0                      | 0.31                     | 9.3   | BLM                              | 5   | 12  | 9.3   |
| Lead (Pb)                      | 7439-92-1 | 2.0                      | 0.093                    | 3   | 3.2                              | 1.2   | 3.2   | 3   |
| Zinc (Zn)                      | 7440-66-6 | 10.0                     | 2.3                      | 100   | 122                              | 66  | 110   | 100   |

**Notes:**

BLM = Biotic Ligand Model

DNR = Department of Natural Resources

EPA = U.S. Environmental Protection Agency

ESL = Ecological Screening Level

ESV = Ecological Screening Value

LANL = Los Alamos National Laboratory

µg/L = microgram(s) per liter

MDL = Method Detection Limit

MRS = Munitions Response Site

NAWQC = National Ambient Water Quality Criteria

NVA = No Value Available

ORNL = Oak Ridge National Laboratory

PQL = Practical Quantitation Limit

PRG = Preliminary Remediation Goals

<sup>a</sup> Iowa Final Rule: ARC 6352B – Chemical Criteria – Effective November 28, 2007. Lowest Class B (aquatic life) criteria presented.

All criteria are “total recoverable”. For hardness dependent criteria, a hardness of 100 mg/L was assumed.

<sup>b</sup> EPA National Ambient Water Quality Criteria (NAWQC), 2009. Lowest freshwater criteria presented. All criteria are “total fraction.” Dissolved WQC were converted to total recoverable using conversion factors presented in Appendix A of the NAWQC guidance (2009), assuming a hardness of 100 mg/L.

<http://water.epa.gov/scitech/swguidance/waterquality/standards/current/index.cfm>.

<sup>c</sup> LANL, 2010. Los Alamos National Laboratory (LANL), 2010. Los Alamos National Laboratory Ecorisk Database, Release 2.5. Wildlife values.

<sup>d</sup> ORNL, 1997. Preliminary Remediation Goals for Ecological Endpoints for Surface Water, ES/ER/TM-162/R2.

<sup>e</sup> The following hierarchy was used: 1) Lower value of Iowa water quality criteria and EPA NAWQC, 2) LANL ESL, and 3) ORNL PRG.

If the laboratory cannot meet any of the PQLs with routine SW-846 methodology (as supported by MDLs that are no greater than 1/3 PQL), the laboratory's PQL must be identified in laboratory submittal as failing to meet the PQL. Some screening values cannot be obtained with routine methodology to the PQL. In those cases the PQL achievable with a routine SW-846 methodology would be accepted.

***Appendix A***  
***Conceptual Site Model***

## 1.0 *Conceptual Site Model – Pistol Range*

---

### 1.1 *Overview*

A site-specific conceptual site model (CSM) summarizes available site information and identifies relationships between exposure pathways and associated receptors. A CSM is used to determine the data types necessary to describe site conditions and quantify receptor exposure, and discusses the following information:

- Current site conditions and future land use;
- Potential munitions and explosives of concern (MEC) and munitions constituents (MC) sources (e.g., lead projectiles in an impact berm);
- Affected media;
- Governing fate and transport processes (e.g., surface water runoff and/or groundwater migration);
- Exposure media (i.e., media through which receptors could contact site-related MEC and MC);
- Routes of exposure (e.g., inhalation, incidental ingestion, and dermal contact); and
- Potential human and/or representative ecological receptors at the exposure point. Receptors likely to be exposed to site MEC or MC are identified based on current and expected future land uses.

The CSM is evaluated for completeness and further developed as needed through Technical Project Planning meetings and additional investigation.

One munitions response site (MRS) is identified at the Fort Des Moines Formerly Used Defense Site (FUDS). The MRS is the Pistol Range, which is identified in the MRS Inventory in the *Defense Environmental Programs Annual Report to Congress Fiscal Year 2009* (Department of Defense [DoD], 2009).

### 1.2 *Background*

The CSM is based on information presented in the revised *Inventory Project Report* (INPR) (U.S. Army Corps of Engineers [USACE], 2010), *Des Moines SuperBlock Southside Planning Study* (City of Des Moines, 2008), *Site Specific Chemical Warfare Materiel (CWM) Scoping and Security Study Report* (Parsons, 2006), *Archives Search Report* (ASR) (USACE, 2006a), and the *ASR Supplement* (USACE, 2004). Additionally, the CSM includes information obtained from site observations made during a site visit conducted on November 30, 2010. The CSM will be updated with information obtained during the Site Inspection (SI).

### *1.2.1 History of Use*

Fort Des Moines was established in 1901 as a cavalry post. Until 1917 multiple companies of infantrymen were stationed at Fort Des Moines. In 1917, Fort Des Moines became an Officers Training Camp for troops and a training camp for medical personnel. Fort Des Moines was converted to a hospital base in 1918 for soldiers recuperating from fighting in Europe. Between 1920 and the beginning of World War II, Fort Des Moines was occupied by a cavalry unit and elements of field artillery units. In 1940, Fort Des Moines was converted into a reception center for Iowa draftees. In 1942, Fort Des Moines was converted into the first training center for the Women's Army Auxiliary Corps. Fort Des Moines was closed in May 1946 and the majority of the fort was declared surplus and the property turned over to the War Assets Administration and subsequently assigned to the Federal Housing Authority. In 1958, Fort Des Moines was reacquired by the DoD and used as the Iowa Sector for the XIV Army Corps Reserve Training Center. In 1976, the former cantonment area of Fort Des Moines was placed on the National Register of Historic Places as a National Historic Landmark District because of its rich cultural history as a training center.

Site maps from 1961 and 1975 depict a "Rifle Range" on the FUDS property at the location of the revised Pistol Range MRS. A review of all available historical aerial photographs and reports suggests that the MRS was most likely used from the late 1950s, perhaps circa 1956-58 when Fort Des Moines had resurgence as a training center, to 1970 when the land was transferred to Polk County. Use of the MRS was limited to small arms where troops would have trained with rifle and pistol munitions of .45-caliber or less.

### *1.2.2 Overview of Site Characteristics*

The MRS is located on land currently owned by Polk County that was renovated into a county park in the 1970s. The Fort Des Moines Park is used primarily for hiking and picnicking and contains nature trails, a children's playground, two picnic shelters, a 1.5-acre arboretum, a ball field, and a manmade lake. The lake is used for boating (canoeing, kayaking, and electric motors only) and fishing; swimming is not permitted (Fort Des Moines Park, 2011). The Pistol Range MRS is located approximately 150 feet (ft) northeast of the manmade lake. The lake is approximately 13 acres in size, about 30 ft deep at its greatest depth, and averages 15 ft in depth. According to the Polk County Conservation Board, the lake was constructed in 1976 during renovation of the property into a county park.

Elevations at the Pistol Range MRS range from approximately 915 ft above mean sea level (AMSL) in the northwestern portion near the earthen salvage wall to approximately 875 ft AMSL in the southeastern portion near the former firing line. The earthen salvage wall remains intact and is approximately 50 yards in length and approximately 25 ft in height. The MRS is located in a heavily wooded area with a thick understory of shrubs and vines. The MRS does not contain intermittent or perennial streams; however, it does contain a small wetland that has

developed on the former range floor extending from the base of the earthen salvage wall throughout much of the range. The wetland appears to be seasonally flooded at the very least and possibly semi-permanently or permanently flooded throughout the year. It is quite likely that when surface water is absent, the water table will be at or very near the surface.

At this time, it is not known whether the wetland is isolated or connects to offsite drainage pathways. The area drainage is expected to be to the east-southeast, towards an unnamed intermittent creek located outside of the MRS boundary near the southeastern border of the FUDS. The intermittent creek flows through a culvert beneath SE 5<sup>th</sup> Street and meanders in a generally southeasterly fashion where it empties into the North River located approximately 1.5 miles to the southeast.

The prominent soil types found in the northwestern portion of the MRS (nearest the salvage wall) are formed from loess and subglacial till and include two soil types found on hill slopes: the Lagoda silty clay loam and the Gara clay loam. The Lagoda silty clay loam is a moderately eroded soil that is found on slopes of 9 to 14 percent and is moderately well drained. The Gara clay loam soil is a moderately eroded soil found on slopes of 9 to 14 percent and is well drained. The Lagoda and Gara loams consist of approximately 33 percent clay in the upper 24 inches of the soil horizon.

Present in the southeastern portion of the MRS (most likely comprising the portion of the MRS where the emergent wetland is located) is the Colo, occasionally flooded-Judson complex. The Colo is a poorly drained soil formed from silty alluvium forming drainage ways on slopes of 2 to 5 percent. The Colo consists of approximately 31 percent clay in the upper 24 inches of the soil horizon. When inundated, the Colo has a very slow infiltration rate and consists chiefly of clays that have a high shrink-swell potential located within a high water table with a claypan or clay layer at or near the surface.

### ***1.2.3 Munitions and Associated MC***

The most likely small arms ammunition used at the MRS would have been the .30-caliber Type M2 ball ammunition used in the carbine rifle. Ball ammunition for the .30-caliber usually contained a slug of antimony-hardened lead. Other small arms rifle ammunition that may have been used would be the .22-caliber long rifle. Pistol calibers would include the .45-caliber M1911, .38-caliber, and .22-caliber short. The predominant MC at small arms ranges includes antimony, copper, lead, and zinc.

### ***1.2.4 Previous MEC Finds***

Documented MEC finds or munitions debris (including debris associated with small arms munitions) has not been reported for the Pistol Range MRS. There are no accounts of site visits to the MRS in the INPR (USACE, 1992), ASR, *ASR Supplement*, or the *Site Specific CWM Scoping and Security Study Report*.

### 1.2.5 Previous MC Sample Results

MC sampling has not occurred at the MRS.

### 1.2.6 Current and Future Land Use

The MRS is located on land zoned in an agricultural district, currently owned by Polk County, and managed by the Polk County Conservation Board (who renovated the parcel into the Fort Des Moines Park in the 1970s). The Fort Des Moines Park provides outdoor recreation, conservation education, and long-term protection of Polk County's natural heritage and is managed for recreational, educational, and ecological purposes. The park's recreational uses include hiking on nature trails, picnicking, children's playground, a 1.5-acre arboretum, a ball field, and a lake. The 13-acre lake is used for boating (canoeing, kayaking, and electric motors only) and fishing; swimming is not permitted. The Pistol Range MRS is located near a nature trail and the lake. Future land use for the MRS is expected to remain as a county park; however, future park improvements are possible.

### 1.2.7 Sensitive Environments

The U.S. Fish and Wildlife Service (USFWS), Rock Island Field Office, lists two endangered species and two threatened species known to exist in Polk County (USFWS, 2010). One endangered species, the Indiana Bat (*Myotis sodalis*), prefers summer habitat in forested areas near permanent bodies of water. The Pistol Range MRS contains the preferred habitat for the Indiana Bat; however, sightings have not been reported. According to a Natural Resources Specialist with the Polk County Conservation Board, one of the Iowa state threatened species, the Oval Ladies-tresses (*Spiranthes ovalis*) a perennial forb, may have potential habitat within the Fort Des Moines Park (Polk County Conservation Board, 2010).

An inventory of existing plant communities present within the Fort Des Moines Park was prepared in July 2007 by a professor of biology at Drake University (Rosburg, 2007). A total of 222 plant species were identified in the Park during the survey. One Iowa State special concern plant species was encountered in small numbers in a few populations in the Fort Des Moines Park. Bush's sedge (*Carex bushii*) was identified approximately 300 ft north of the MRS. The plant community survey did not identify the Oval Ladies-tresses. The small emergent wetland located on the MRS was mapped during the survey (Rosburg, 2007).

The Iowa Department of Natural Resources (IDNR) Conservation and Recreation Division, states "The Department has searched for records of rare species and significant natural communities in the project area and found no site-specific records that would be impacted by this project. However, these records and data are not the result of thorough field surveys. If listed species or rare communities are found during the planning or construction phases, additional studies and/or mitigation may be required" (IDNR, 2010).

A small wetland has developed on the former small arms range floor since the range closed circa 1970. This emergent wetland may qualify the MRS as an Important Ecological Place (IEP) or Sensitive Environment as defined by the USACE (2006b) or the U.S. Environmental Protection Agency (1997).

### ***1.3 MEC Evaluation***

This section provides an evaluation of the potential MEC associated with the munitions formerly used at the MRS. An analysis of the exposure pathways and receptors for MEC is provided in Diagram 1.

#### ***1.3.1 Types of MEC***

Discarded small arms ammunition (such as .22-, .30-, .38-, or .45-caliber cartridges) is potentially present. Discarded cartridges would typically be found at small arms ranges near the firing lines and not at the target areas.

#### ***1.3.2 Human Receptors***

Human receptors include recreational site users and county park workers or employees.

#### ***1.3.3 Route of Exposure***

The primary potential route of human exposure to MEC is through direct contact in surface soil. Receptors are not expected to be exposed to MEC through intrusive activities in subsurface soil.

#### ***1.3.4 MEC Risk Assessment***

A deliberate effort must be applied (using a tool resembling a firing pin) to a very specific small point (the primer) to make a discarded small arms round function. Therefore, the potential presence of discarded small arms ammunition at a former small arms range is considered to present no significant explosive hazard. There have not been any reports of the discovery of intact cartridges. The MEC exposure pathway is considered to be incomplete.

### ***1.4 MC Pathway Evaluation***

This section provides an evaluation of the potential MC associated with the munitions formerly used at the Pistol Range MRS. An analysis of the exposure pathways and receptors for MC is provided in Diagram 2.

#### ***1.4.1 Types of MC***

The most likely small arms ammunition used at the FUDS would have been the .22- and .30-caliber long rifle, and the .22-caliber short, the .38-caliber, and the .45-caliber pistol. The MC of concern are the metals antimony, copper, lead, and zinc.

The projectile (bullet) and cartridge case (containing propellant and primer) contain other constituents that are excluded from the site inspection. The four selected metallic constituents

are Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances and are appropriate indicator analytes for analysis (lead, antimony, copper, and zinc). Other metals are non-hazardous (e.g., iron), minor constituents with limited potential quantities (nickel, a possible minor constituent of projectile jacketing), or are both non-hazardous and involve limited potential quantities (e.g., barium, calcium, magnesium, potassium, and other components). Primer and propellant are largely dispersed in the air upon firing and involve limited potential quantities.

## ***1.4.2 Soil Exposure Pathway***

### ***1.4.2.1 Sources of MC***

Potential sources of MC would be derived from spent small arms ammunition and would be deposited on site soils primarily in the earthen salvage wall located behind the target area. The primary source of potential MC (i.e., the earthen salvage wall) remains intact.

### ***1.4.2.2 Exposure Pathway***

The primary exposure pathway for the dispersal of potential MC is from direct contact with soil in the earthen salvage berm. The berm (which remains entirely intact) is located behind the former target area at the MRS and is suspected to be the greatest source of potential MC from lead in projectiles. Human and ecological receptors could be exposed to the soil in the berm.

### ***1.4.2.3 Land Use and Access***

The MRS is owned by Polk County and managed by the Polk County Conservation Board as the Fort Des Moines Park. The park is used for recreational, educational, and ecological purposes. The MRS is relatively inaccessible; however it is located near a nature trail and the 13-acre fishing lake. The Fort Des Moines Park can be accessed via County Park Road to the north (from SE 5<sup>th</sup> Street to the east).

### ***1.4.2.4 Human Receptors***

The potential routes of human exposure to potentially contaminated soil are dermal contact and ingestion. Potential receptors include recreational site users and Polk County workers and employees.

### ***1.4.2.5 Human Health Assessment***

The soil pathway is considered to be potentially complete for human receptors. The location of the MRS is in a wooded area with densely covered understory of shrubs and vines and would most likely limit potential human exposure. Furthermore, the marshy conditions present on the range floor would hinder human interaction.

#### *1.4.2.6 Ecological Assessment*

The MRS is located within a county park that provides outdoor recreation, conservation education, and long-term protection of the county's natural heritage. Based on the information gathered to date, the MRS is assumed to be managed for ecological purposes and is an IEP. Further evaluations are underway regarding the ecological significance of the wetland on the MRS and the confirmation of habitat for Iowa state threatened and endangered species.

A screening level ecological risk assessment will be performed for the MRS because of its suspected status as an IEP. One exposure pathway for the dispersal of potential MC to ecological receptors is from direct contact with soil in the earthen salvage wall located behind the target area. Surface soil samples collected near the base of the berm will be screened against ecological screening values.

### *1.4.3 Surface Water/Sediment Pathway*

#### *1.4.3.1 Sources of MC*

Potential sources of MC are derived from spent small arms ammunition (lead, copper, antimony, and zinc) and are deposited on site soils primarily in the earthen salvage wall located behind the target area. Surface water runoff from the salvage wall may have resulted in migration of MC to the surface water/sediment pathway. The small wetland located in the target area is the surface water feature nearest to the salvage wall. MC present in the soil may wash from soil located near the base of the earthen salvage wall into nearby sediment and into surface water present in the wetland, particularly during periods of seasonal flooding.

#### *1.4.3.2 Migration Pathway*

The Pistol Range MRS does not contain intermittent or perennial surface water streams; however, the approximate 0.25-acre wetland present near the base of the earthen salvage wall extends throughout much of the former range floor. It is not known at this time whether the wetland present at the MRS is isolated and thus contains no downstream outlet. It is possible that some surface runoff from the MRS range floor could occur (particularly during periods of seasonal flooding) with drainage to the east-southeast, towards an unnamed intermittent creek located near the southeastern border of the FUDS. The intermittent creek flows through a culvert beneath SE 5<sup>th</sup> Street and meanders in a generally southeasterly fashion where it empties into the North River located approximately 1.5 miles to the southeast. Any potential connection or interaction between the wetland on the MRS and the intermittent creek located near the FUDS border will be confirmed during the performance of field activities.

The most likely exposure pathway is from direct contact with surface water present in the wetland during periods of inundation.

#### *1.4.3.3 Surface Water Use and Access*

Perennial or intermittent streams or creeks are not present on the MRS. The surface water present at the MRS is confined to the water present in the wetland during periods of inundation. There are no known uses of the water present in the wetland (such as fishing, for example).

The MRS is relatively inaccessible; however, it is located near a nature trail and a 13-acre lake used for fishing and boating. The marsh is completely surrounded by woods with a thick understory of shrubs, vines, and thorns. The emergent wetland contains cattails, sedges, bulrushes, and grasses that would be difficult to walk through.

#### *1.4.3.4 Human Receptors*

Potential receptors include recreational site users and Polk County workers and employees.

#### *1.4.3.5 Human Health Assessment*

The surface water/sediment pathway is considered to be potentially complete for human receptors via dermal contact because the most likely exposure pathway is from direct contact with surface water present in the wetland during periods of inundation. Exposure to surface water through an ingestion pathway is not considered viable. The location of the MRS in a wooded area with densely covered understory of shrubs and vines would most likely limit potential human exposure to the MRS. The marshy conditions present on the range floor would discourage human interaction. Further, the frequency and duration of inundated conditions at the wetland are not known but may have periods where the ground's surface is not saturated for periods such as seasonal drought. While it is possible that surface water with poor aesthetic qualities (such as contained within a wetland) might be ingested accidentally, it is highly unlikely that receptors would consume it more than once; therefore, exposure to the surface water via ingestion is considered to be an incomplete pathway. The surface water/sediment pathway, while considered to be potentially complete for human receptors, is not expected to pose a significant human health risk.

#### *1.4.3.6 Ecological Assessment*

One exposure pathway for the dispersal of potential MC to ecological receptors is from direct contact with sediments and standing surface water present in the emergent wetland located in the former target area. Sediment and surface water samples collected in this area will be screened against ecological screening values.

#### *1.4.4 Groundwater Pathway*

There are no known exposure points to groundwater (i.e., potable drinking water wells located downgradient and within a distance of potential influence). Unless a significant source of MC is present in the soil and sediment at the MRS, the groundwater pathway is expected to be incomplete.

The dynamic transition zone between the water present on the ground's surface in the form of inundated wetlands and the shallow groundwater is the focus of this SI because of its exposure potential to recreational site users or county park workers. Deeper groundwater is not expected to pose an exposure risk to human receptors.

The soil present in the portion of the MRS where the emergent wetland is located is poorly drained with very slow infiltration rates. These soils consist chiefly of clays that have a high shrink-swell potential located within a high water table with a claypan or clay layer at or near the surface. These characteristics further hinder the surface to groundwater pathway.

#### ***1.4.5 Air Pathway***

Air is not considered to be a significant pathway because inhalation of MC in vapor form is not an exposure route for non-volatile MC under normal environmental conditions. The potential inhalation of soil particles is included in the development of health-based screening values for soil. The air pathway is considered to be incomplete.

### 1.5 CSM Summary/Data Gaps

Evaluation of the CSM indicates the following known conditions or data gaps:

| Pathway       | Presence of MEC  | Presence of MC                      | Notes  |
|---------------|--|-------------------------------------|--|
| Soil          | Small arms rounds and/or duds possible (but have not been reported at the MRS) | Potentially complete pathway        | Earthen salvage wall located behind target area remains intact.  |
| Sediment      | Small arms round and/or duds possible (but have not been reported at the MRS)  | Potentially complete pathway        | A small wetland has developed on the range floor since the MRS closed circa 1970. Sediment located near the base of the salvage wall in the former target area will be sampled.          |
| Surface Water | No   | Potentially complete pathway        | A small wetland is located on the range floor within the MRS. Surface water located near the base of the salvage wall in the former target area will be sampled.                         |
| Groundwater   | No   | Considered to be incomplete pathway | Unless a substantial source of MC is found in the soil/sediment at the base of the salvage wall and in the former target area, it is unlikely that deeper groundwater would be affected. |
| Air           | No   | Considered to be incomplete pathway | Inhalation of MC in vapor form is not an exposure route for non-volatile MC under normal environmental conditions.   |

## 2.0 References

---

City of Des Moines. 2008. *Des Moines SuperBlock Southside Planning Study*. Prepared by the City of Des Moines (and contractors). March 2008.

Department of Defense (DoD). 2009. *Defense Environmental Programs Annual Report to Congress Fiscal Year 2009, MRS Inventory*. Website: <http://deparc.xservices.com/do/mmrp>.

Fort Des Moines Park. 2011. Website: <http://www.mycountyparks.com/County/Polk/Park/Fort-Des-Moines-Park.aspx>. Queried January 2011.

Iowa Department of Natural Resources (IDNR). 2010. Letter from Daryl Howell, Environmental Specialist (IDNR) to Greg McGraw (Shaw). Subject: Environmental Review for Natural Resources, Polk County, Sections 33 and 44, Township 78N, Range 24W. Undated letter received July 19, 2010.

Parsons. 2006. *Final Site Specific Chemical Warfare Materiel Scoping and Security Study Report, Fort Des Moines FUDS No. B07IA072903*. Prepared for U.S. Army Engineering and Support Center, Huntsville (USAESCH). December 5, 2006.

Polk County Conservation Board. 2010. Email correspondence from Mr. Loren Lown, Natural Resources Specialist (Polk County Conservation Board) to Mr. Greg Sisco, MMRP Technical Lead (Shaw). Subject: Ft Des Moines TPP Meeting. October 29, 2010.

Rosburg, Thomas, PhD. 2007. *Botanical Survey For Fort Des Moines County Park*. Prepared for Polk County Conservation Board by Thomas Rosburg, Associate Professor of Biology, Drake University, Des Moines, Iowa. July 6, 2007.

U.S. Army Corps of Engineers (USACE). 1992. *DERP-FUDS, Inventory Project Report for Site No. B07IA0729, Fort Des Moines, Polk County, Iowa*. June 1992.

U.S. Army Corps of Engineers (USACE). 2004. *ASR Supplement, Fort Des Moines, Pistol Range MRS*. November 2004.

U.S. Army Corps of Engineers (USACE). 2006a. *Archives Search Report, Fort Des Moines, Polk & Warren Counties, Iowa*. December 2006.

U.S. Army Corps of Engineers (USACE). 2006b. *Screening-Level Ecological Risk Assessments for FUDS MMRP Site Inspections*. Prepared by USACE HTRW CX. August 11, 2006.

U.S. Army Corps of Engineers (USACE). 2010. *DERP-FUDS, Revised Inventory Project Report (INPR) for Property No. B07IA0729, Fort Des Moines, Des Moines, Iowa*. June 2010.

U.S. Environmental Protection Agency (EPA). 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecologic I Risk Assessments (ERAGS)*. USEPA/540/R-97/006, OSWER Directive # 9285.7-25. June 1997.

U.S. Fish and Wildlife Service (USFWS). 2010. Iowa County Distribution of Federally Threatened, Endangered, Proposed and Candidate Species. Website: [http://www.fws.gov/midwest/endangered/lists/iowa\\_cty.html](http://www.fws.gov/midwest/endangered/lists/iowa_cty.html) . Last updated September 14, 2010. Queried December 2010.

**SOURCE**

**INTERACTION**

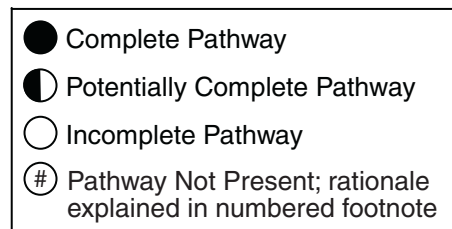
**RECEPTORS**

| <i>Munitions Response Site</i> | <i>Type of MEC</i> | <i>MEC Location/Release Mechanisms</i> | <i>Activity</i> | <i>Receptors</i> |
|--------------------------------|--------------------|--|-----------------|------------------|
|--------------------------------|--------------------|--|-----------------|------------------|

|                       |                         |
|-----------------------|-------------------------|
| County Park Employees | Recreational Site Users |
|-----------------------|-------------------------|



① Pathway incomplete because small arms ammunition does not present a significant explosive hazard.



SOURCE

MUNITIONS  
RESPONSE  
SITE

PRIMARY  
SOURCE

PRIMARY MEDIA  
OF CONCERN

INTERACTION

RELEASE  
MECHANISM

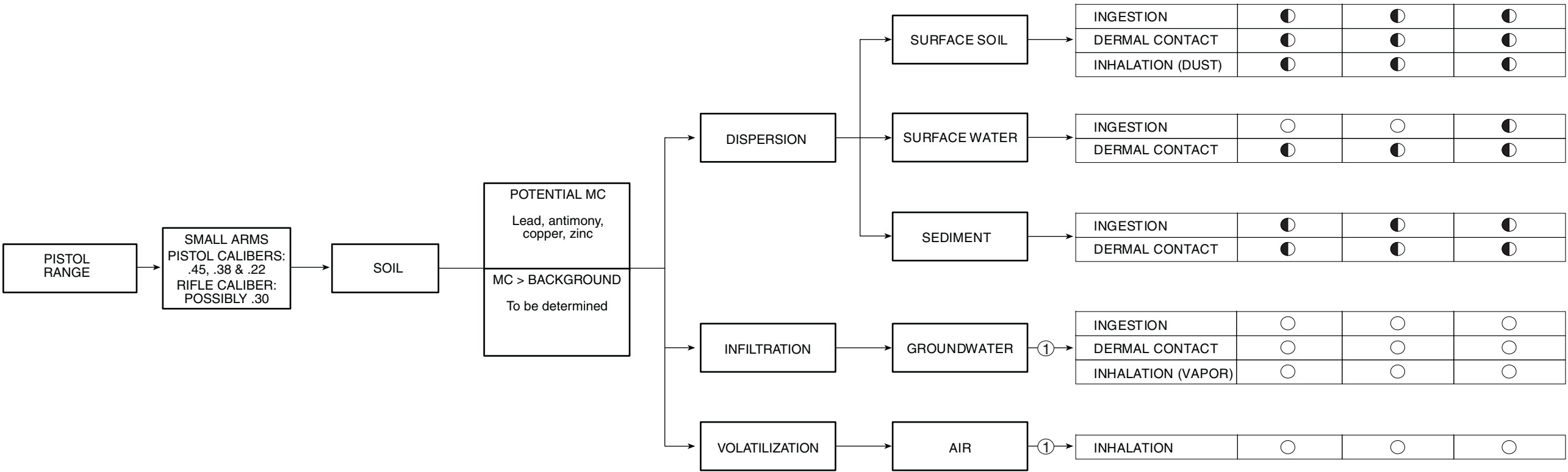
EXPOSURE  
MEDIA

EXPOSURE  
ROUTES

RECEPTORS

CURRENT/FUTURE

| COUNTY PARK<br>EMPLOYEES | RECREATIONAL<br>SITE USERS | BIOTA |
|--------------------------|----------------------------|-------|
|--------------------------|----------------------------|-------|



① Not considered viable pathways.

- Complete Pathway
- ◐ Potentially Complete Pathway
- Incomplete Pathway
- Ⓢ Pathway Not Present; rationale explained in numbered footnote

Diagram 2  
MC Exposure Pathway Analysis  
Fort Des Moines  
Pistol Range MRS

***Appendix B***  
***USACE Interim Guidance Document 06-05***  
***and Safety Advisory 06-2***



REPLY TO  
ATTENTION OF:

DEPARTMENT OF THE ARMY  
HUNTSVILLE CENTER, CORPS OF ENGINEERS  
P.O. BOX 1600  
HUNTSVILLE, ALABAMA 35807-4301

MAR 16 2006

CEHNC-OE-CX

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Procedure for Preliminary Assessment (PA) and Site Inspection (SI) Teams that Encounter Unexploded Ordnance (UXO) While Gathering Non-UXO Field Data, Military Munitions Center of Expertise (MM CX) Interim Guidance Document (IGD) 06-05

1. PURPOSE: This procedure describes the responsibilities of project teams during the preliminary assessment and site investigation phases should unexploded ordnance (UXO) be discovered.
2. APPLICABILITY: This guidance is applicable to the geographic military Districts, Military Munitions Response Program (MMRP) Design Centers, Major Subordinate Commands (MSCs), and designated Remedial Action Districts performing MMRP response actions.

3. REQUIREMENTS AND PROCEDURES:

a. During site visits to formerly used defense site (FUDS) properties to gather PA or SI information, in the rare instance that a UXO-qualified individual identifies an item that is an explosive hazard, the following actions will occur:

(1) The property owner or individual granting rights of entry to the property will be notified of the hazard and advised to call the local emergency response authority (i.e., police, sheriff, or fire department). The individual will also be informed that if they do not call the local response authority within 1 hour, the individual who identified the UXO item will notify the local emergency response authority.

(2) The local response authority will decide how to respond to the reported incident, including deciding not to respond (e.g., if the local response authority is already aware of the hazards on the property). If the local response authority decides to respond, the individual who identified the item or his designee will mark the location of the item and provide accurate location information to the emergency response authority. The individual who identified the item or his designee will generally remain in the area until the local response authority arrives, unless specifically indicated by the appropriate response authority that the individual may leave the area.

(3) During the SI, the state regulator may also be notified at their request.

MAR 16 2006

CEHNC-OE-CX

SUBJECT: Procedure for Preliminary Assessment (PA) and Site Inspection (SI) Teams that Encounter Unexploded Ordnance (UXO) While Gathering Non-UXO Field Data, Military Munitions Center of Expertise (MM CX) Interim Guidance Document (IGD) 06-05

b. During site visits to active installations or Base Realignment and Closure (BRAC) sites to gather PA or SI information, in the rare instance that a UXO-qualified individual identifies an item that is an explosive hazard, the following actions will occur:

(1) The installation point of contact (POC) or the BRAC coordinator will be notified of the hazard and requested to notify explosive ordnance disposal (EOD) through their channels.

(2) The installation/EOD will make the determination if they are going to respond to the incident. The installation/EOD may be aware of the hazards at the site and make the decision not to respond. If the installation/EOD decides to respond, the individual who identified the item or his designee will mark the location and provide accurate location information to the installation/EOD unit and will remain in the area unless the installation/EOD unit requests otherwise.

c. Neither the US Army Corps of Engineers personnel, nor their contractors have the authority to call EOD to respond to an explosive hazard. This call is the responsibility of the local emergency response authority for FUDS properties and it must come through the proper chain of command on installations.

d. AR 75-14 and AR 75-15 contain the information on how EOD responds to explosives hazards.

4. EFFECTIVE DATES: The requirements and procedures set forth in this interim guidance are effective immediately. They will remain in effect indefinitely, unless superseded by other policy or regulation.

5. POINT OF CONTACT: If you need additional information, please contact Mr. Brad McCowan at 256-895-1174.



CAROL A. YOUKEY, P.E.  
Chief, Center of Expertise for Ordnance  
and Explosives Directorate



DEPARTMENT OF THE ARMY  
HUNTSVILLE CENTER, CORPS OF ENGINEERS  
P.O. BOX 1600  
HUNTSVILLE, ALABAMA 35807-4301  
May 23, 2006

REPLY TO  
ATTENTION OF:

OE Safety Division for Ordnance  
and Explosives Directorate

Shaw Environmental  
4171 Essen Lane  
Baton Rouge, Louisiana 70809

Dear Sir/Madam:

This is Safety Advisory 06-2 – Munitions and Explosives of Concern (MEC) Safety During Site Inspections (SI), Pre-Work Plan Visits, Archive Search Reports (ASR) Investigations and Other Site Visits of a Non-Intrusive Nature.

Reference EP 75-1-1, EP 385-1-95a, and Interim Guidance Document (IGD), March 15, 2006.

The following procedures will be followed if an item is found that has an explosive hazard during the activities identified in the subject line:

- a. MEC items are not to be moved or disturbed during the above subject SI, Pre-Work Plan visits, ASR Investigations and other site visits of a non-intrusive nature.
- b. The locations of any discovered explosive hazardous items should be marked for accurate relocating purposes and the information provided to the designated Point of Contact (POC) and any emergency response authorities as may be required.
- c. During site visits to active Installations and/or Base Realignment and Closure (BRAC) sites the identified Installation POC or the BRAC coordinator should be notified of discovered MEC hazards. They then will request any appropriate emergency response action as deemed necessary through their channels if required.
- d. When a site visit is on a Formerly Utilized Defense Site, the property owner shall be notified in the event of finding any found explosive hazards along with the location of the explosive item(s) found, the property owner should then in turn notify their local emergency response authorities.

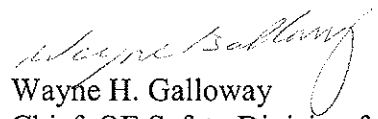
e. During these site visits all required MEC security requirements should be implemented as necessary and required. All team members are to be instructed in and made aware of any MEC security requirements.

f. All team members will be briefed on these procedures prior to any site investigations being performed and daily before any work begins.

This Safety Advisory is intended to serve as an explosives safety reminder.




Comments or questions about this Safety Advisory can be directed to the undersigned at (256) 895-1598/82.

Sincerely,

A handwritten signature in cursive script, appearing to read "Wayne H. Galloway", is written over the printed name.

Wayne H. Galloway  
Chief, OE Safety Division for  
Ordnance and Explosives Directorate

***Appendix C***  
***Site Safety and Health Plan Addendum***

|  |             |  |
|--|-------------|--|
| <b>ADDENDUM <u>IA-5</u> TO SITE SAFETY AND HEALTH PLAN (SSHP)</b><br><b>REVIEWS AND APPROVAL</b><br>US Army Corps of Engineers, Omaha District |             | This SSHP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1. |
| <b>Reviewer</b>  | <b>Date</b> | <b>Signatures</b>  |
| <b>Authored by:</b><br>Greg Sisco  | 3/15/11     | <b>Signature:</b><br>                     |
| <b>Peer Review by:</b><br>David Mummert, CIH   | 3/23/11     | <b>Signature:</b><br>                     |
| <b>Quality Control Review (QCR) by:</b><br>Brian Tanaka  | 3/29/11     | <b>Signature:</b><br>                     |
| <b>Project Manager Review by:</b><br>Peter Kelsall   | 3/23/11     | <b>Signature:</b><br>Signature on file   |
| <b>USACE Omaha District MM DC OE Safety Specialist Review:</b>   |             | <b>Signature:</b>  |
| <b>USACE Omaha District MM DC Project Manager Acceptance:</b><br>John Miller   |             | <b>Signature:</b>  |

|   |  |
|---|--|
| ADDENDUM <u>IA-5</u> TO SITE SAFETY AND HEALTH PLAN (SSHP)<br><b>TITLE PAGE</b><br>US Army Corps of Engineers, Omaha District   | This SSHP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1. |
| PROJECT NAME: Formerly Used Defense Site (FUDS) Site Inspection (SI) – Fort Des Moines  |  |
| PURPOSE OF ADDENDUM:<br><br>This Addendum provides details specific to activities at this FUDS that were not provided in the approved Accident Prevention Plan and Site Safety and Health Plan included in the <i>Final Type I Work Plan, Site Inspections at Multiple Sites, NWO Region</i> (Work Plan; Shaw, 2006). |  |
| DESCRIBE THE CHANGES EFFECTED BY THIS ADDENDUM:<br><br>Site-specific supplemental information noted in following text.  |  |

### **SITE SAFETY AND HEALTH PLAN ADDENDUM**

|                        |  |
|------------------------|--|
| Site Name:             | Fort Des Moines  |
| Site Location:         | The Fort Des Moines FUDS is located in Des Moines, Polk County, Iowa. The munitions response site (MRS) is the Pistol Range.   |
| Purpose of Visit:      | SI to conduct site reconnaissance for munitions and explosives of concern (MEC) at former small arms range and to collect surface soil, sediment, and surface water samples to evaluate the presence of select metals. |
| Date(s) of Site Visit: | June 2011  |
| Office:                | Shaw Environmental, Inc., Denver, Colorado   |
| Address:               | 7604 Technology Way, Suite 300<br>Denver, CO 80237   |
| Telephone:             | 720-554-8178   |

Date Prepared: March 15, 2011

## I. SITE DESCRIPTION AND PREVIOUS INVESTIGATIONS

(A site map is provided in the Site-Specific Work Plan.)

### A. SITE DESCRIPTION:

- Size: One former small arms firing range MRS covering approximately 1.3 acres.
- Present Usage (Check all that apply)

|   |  |   |
|---|--|---|
| <input type="checkbox"/> Military   | <input checked="" type="checkbox"/> Recreational | <input type="checkbox"/> Agricultural (primary use) |
| <input type="checkbox"/> Residential  | <input type="checkbox"/> Commercial              | <input type="checkbox"/> Landfill                   |
| <input checked="" type="checkbox"/> Natural Area  | <input type="checkbox"/> Industrial              |   |
| <input checked="" type="checkbox"/> Other Specify: MRS is located within ~90-acre Fort Des Moines Park (county park). |  |   |

|   |  |                                  |
|---|--|----------------------------------|
| <input type="checkbox"/> Secured              | <input type="checkbox"/> Active              | <input type="checkbox"/> Unknown |
| <input checked="" type="checkbox"/> Unsecured | <input checked="" type="checkbox"/> Inactive |                                  |

### B. PAST USES:

Fort Des Moines was established in 1901 as a cavalry post. Until 1917 multiple companies of infantrymen were stationed at Fort Des Moines. In 1917, Fort Des Moines became an Officers Training Camp for troops and a training camp for medical personnel. Between 1920 and the beginning of World War II, Fort Des Moines was occupied by a cavalry unit and elements of field artillery units. In 1940, Fort Des Moines was converted into a reception center for Iowa draftees. In 1942, Fort Des Moines was converted into the first training center for the Women's Army Auxiliary Corps. Fort Des Moines closed in May 1946 and the majority of the fort was declared surplus. In 1958, Fort Des Moines was reacquired by the DoD and used as the Iowa Sector for the XIV Army Corps Reserve Training Center.

A review of all available historical aerial photographs and reports suggests that the MRS was most likely used in the late 1950s, perhaps circa 1958 when Fort Des Moines was reacquired by the Department of Defense (DoD) and served again as a training center, to 1970 when the land was transferred to Polk County. Use of the MRS was limited to small arms where troops would have trained with rifle and pistol munitions of .45-caliber or less.

### C. SURROUNDING POPULATION:

|   |   |  |
|---|---|--|
| <input type="checkbox"/> Rural            | <input checked="" type="checkbox"/> Residential | <input checked="" type="checkbox"/> Commercial |
| <input checked="" type="checkbox"/> Urban | <input type="checkbox"/> Industrial             |  |
| <input type="checkbox"/> Other Specify:   |   |  |

### D. PREVIOUS SAMPLING/INVESTIGATION RESULTS:

An *Archives Search Report* (ASR) completed in 1985 stated that a "pistol/rifle range was formerly located on that portion of property exceded to the Polk County Conservation Board." The *Inventory Project Report* (INPR) completed in 1992 references "several rifle and small arms ranges and training areas at the FUDS" and states that "projectiles

and casings have been found during excavation for construction of a new housing development on the former site.” The INPR also states that “no live shells have been encountered.” The U.S. Army Corps of Engineers (USACE) completed an ASR in 2006 and reported that the director of the Fort Des Moines Engineering Office thought the range was located under the 13-acre county lake. None of these studies describe a site visit. MEC reconnaissance or munitions constituents (MC) sampling has not occurred at the Pistol Range MRS.

Shaw has used a historical aerial photograph review, interviews with Polk County Conservation Board employees, and a site visit to confirm that the location of the former range is ~150 ft northeast of the lake.

(1) MEC ENCOUNTERED: MEC or munitions debris (MD) has not be observed on the range. Shell casings have not been reported.

(2) SAMPLES: None collected.

| Chemical | Concentration | Media | Location |
|----------|---------------|-------|----------|
| None.    | None.         | None. | None.    |

## II. DESCRIPTION OF ON-SITE ACTIVITIES

|   |  |                                   |
|---|--|-----------------------------------|
| <input checked="" type="checkbox"/> Walk Through  | <input type="checkbox"/> Drive Through       | <input type="checkbox"/> Fly Over |
| <input type="checkbox"/> On-Road  | <input checked="" type="checkbox"/> Off-Road | <input type="checkbox"/> On-Path  |
| <input checked="" type="checkbox"/> Off-Path  |  |                                   |
| <input checked="" type="checkbox"/> Other Specify: Shaw may perform some reconnaissance in wetland area depending upon site conditions at the time of field activities. |  |                                   |

### Activities/Tasks to be Performed

#### Reconnaissance

A visual surface reconnaissance will be performed within the MRS using a meandering path walkover to assess potential evidence of former military activities that could be used to verify the conceptual site model (CSM). The following conditions will be recorded in the field logbook and documented by digital photographs and global positioning system (GPS):

- Presence or absence of MEC, shell casings, bullets or bullet fragments, or other MD;
- Location and physical description of range features such as firing line(s), target area(s), firing backstop or salvage wall, and historical military signs.

The site reconnaissance will be performed by conducting a visual inspection of appropriate and accessible portions of the range by a field team of two or more persons, including a qualified unexploded ordnance (UXO) technician. The UXO technician will supplement the visual inspection with the use of a hand-held fluxgate magnetometer (ferrous objects) and an all-metals detector (lead projectiles and copper or brass cartridge cases) in areas where vegetation or soil cover may obscure potential ferrous objects. The path walked during the reconnaissance will be

recorded using a hand-held GPS unit. Reconnaissance will not include detailed mapping; however, GPS waypoints and tracks will be presented on SI figures. The reconnaissance effort will be concentrated in the general vicinity of the earthen salvage wall and former target area, as determined from historical evidence. Touching or handling of MEC or MD will not be allowed.

### **Sampling (Surface Soil, Sediment, and Surface Water)**

A total of 7 samples will be collected from the Pistol Range MRS from the following media and locations:

- (a) Four surface soil samples will be collected near the base of the earthen salvage wall located behind the target area where runoff would encourage the deposition of MC.
- (b) Three collocated sediment and surface water sample pairs will be collected from the wetland located on the range floor in the former target area. Sediment samples will be collected as discrete grab samples. Surface water samples will only be collected if the water present at the time of field sampling activities is determined by the field team to be of sufficient depth (and quality) to adequately represent potential MC concentration in this site medium. For example, highly turbid water or water not pooled above the ground's surface at a depth sufficient for sampling, may not be collected. Sediment samples will be collected regardless of the presence of water. If conditions permit surface water sampling, the surface water will be collected both as filtered and unfiltered fractions.
- (c) Ten background surface soil samples and one collocated sediment/surface water sample pair will be collected at areas outside the MRS where prior military activities are not expected.

The exact location of all soil samples will be determined during the site investigation based on the visual identification of MEC, MD, or other suggestive features. Surface soil and sediment samples will be collected adjacent to MEC or munitions debris from former target areas or the earthen backstop salvage wall.

### **III. SITE PERSONNEL AND RESPONSIBILITIES**

| Name/Responsibility   | Training            |                                 |                                       |   |           |        |                   |
|---|---------------------|---------------------------------|---------------------------------------|---|-----------|--------|-------------------|
|   | HAZWOPER<br>40-hour | HAZWOPER<br>8-hour<br>Refresher | Hazardous<br>Waste Site<br>Supervisor | Shaw Site<br>Safety<br>Officer<br>(SSO) | First Aid | CPR    | UXO<br>Specialist |
| Cindy Burns/ Field<br>Team Leader/Site<br>Safety and Health<br>Officer (SSHO) | 9/2001              | 11/2010                         | 7/2009                                | *                                       | 4/2010    | 3/2011 | NA                |
| UXO Technician<br>To be Determined  | √                   | √                               | √ or NA                               | √ or NA                                 | √         | √      | √                 |

\* Shaw SSO training not needed for this FUDS.

NA – not applicable.

√ – Indicates that the UXO technician has training. Dates to be furnished after the UXO technician is assigned.

#### IV. HAZARD ANALYSIS

##### A. Safety and Health Hazards Anticipated:

|  |  |   |
|--|--|---|
| <input checked="" type="checkbox"/> Heat Stress  | <input type="checkbox"/> Cold Stress           | <input checked="" type="checkbox"/> Tripping Hazard |
| <input type="checkbox"/> Noise   | <input type="checkbox"/> Electrical            | <input type="checkbox"/> Falling Objects            |
| <input type="checkbox"/> Foot Hazard   | <input checked="" type="checkbox"/> Biological | <input type="checkbox"/> Overhead Hazard            |
| <input type="checkbox"/> Radiological  | <input type="checkbox"/> Confined Space        | <input type="checkbox"/> Water                      |
| <input type="checkbox"/> Explosive   | <input type="checkbox"/> Climbing              | <input type="checkbox"/> Flammable                  |
| <input checked="" type="checkbox"/> Other Specify: portion of range located in small wetland area. |  |   |

##### B. Overall Hazard Evaluation:

|                               |                                   |   |                                  |
|-------------------------------|-----------------------------------|---|----------------------------------|
| <input type="checkbox"/> High | <input type="checkbox"/> Moderate | <input checked="" type="checkbox"/> Low | <input type="checkbox"/> Unknown |
|-------------------------------|-----------------------------------|---|----------------------------------|

##### JUSTIFICATION:

The MRS was used as a small arms firing range only. Small arms ammunition debris consisting of cartridge casings, projectiles, or fragments has not been reported. Explosive hazards are not posed by these items should they be encountered.

#### V. SITE INSTRUCTIONS FOR MEC AVOIDANCE

See Section 4.3 of the SSHP for full scope of MEC avoidance requirements.

- a. DO NOT touch or move any ordnance items regardless of the marking or apparent condition.
- b. DO NOT visit an ordnance site if an electrical storm is occurring or approaching. If a storm approaches during a site visit, leave the site immediately and seek shelter.
- c. DO NOT use radio or cellular phones in the vicinity of suspected ordnance items.
- d. DO NOT walk across an area where the ground cannot be seen. If dead vegetation or dead animals are observed, leave the area immediately due to potential chemical agent contamination.
- e. DO NOT drive vehicles into suspected MEC areas; use clearly marked lanes.
- f. DO NOT carry matches, lighted cigarettes, lighters, or other flame producing devices into a MEC site.
- g. DO NOT rely on color codes for positive identification of ordnance items or their contents.
- h. Only the on-site UXO technician is allowed to approach suspected ordnance items to take photographs, and prepare a full description (take notes of the markings or any other identifiers/features).
- i. The location of any ordnance items found during the SI should be clearly marked so it can be easily located and avoided.
- j. Always assume ordnance items contain a live charge until it can be determined otherwise.

Section 4.3 of the SSHP defines on-site MEC avoidance requirements for FUDS properties. In general, the purpose of MEC or anomaly avoidance during SI activities is to avoid any potential surface or subsurface anomalies. Intrusive anomaly investigation is not authorized during MEC avoidance operations. The reconnaissance and sampling field work shall include a minimum of two people, one of whom shall be a UXO technician. This team will be on-site during all

sampling activities. Sampling personnel must be escorted at all times in areas potentially containing MEC until the UXO team has completed the access surveys and the cleared areas are marked. If anomalies or MEC are detected, the UXO team will halt escorted personnel in place, select a course around the item, and instruct escorted personnel to follow. If MEC is encountered, the team will stop work in the vicinity and make notifications as outlined in the Work Plan. The team is not to conduct further investigation or removal of any MEC.

## **VI. SITE CONTROL AND COMMUNICATIONS**

A. SITE WORK ZONES: UXO avoidance will be conducted in accordance with the SSHP and USACE EP 75-1-2 during all SI activities. Rigid demarcation of work zones, e.g., using barricades or caution tape, will generally not be required for this project. The Field Team Leader/SSHO, in consultation with the UXO technician, will determine the boundary of an Exclusion Zone (EZ) to be established around a specific area of activity, appropriate to the potential hazards. The boundaries may be described by physical features, e.g., fences, tree lines, or topographic features, or may be defined by a radius around the center of activity. The EZ boundary will be verbally communicated to team members, who will maintain a watch to assure that only field team members are within the work zone. If a bystander or intruder approaches the EZ, the field team will cease work and ask the person to remain outside the area. A Contamination Reduction Zone (CRZ) will generally not be required because personnel decontamination is not anticipated. If required, a CRZ will be established in a manner similar to that described for the EZ. The support zone will consist of all portions of the site not defined as an EZ or CRZ.

### **B. COMMUNICATIONS:**

(1) ON-SITE: Verbal communications will be used among team members to communicate to each other on-site. If this communication is not possible, the following hand signals will be used.

GRIP PARTNER'S WRIST OR BOTH HANDS AROUND WAIST – Leave the area immediately.

HAND GRIPPING NOSE – Unusual smell detected.

THUMBS UP – OK, I am alright or I understand.

THUMBS DOWN – No, negative.

(2) OFF-SITE: Off-site communications will be established at the site and may include an on-site cellular phone or the nearest public phone or private phone that may be readily accessed.

☒ Cellular Phone: Cindy Burns (720) 984-6117

☐ Public/Private phone

| TELEPHONE NUMBERS:  |   |
|---|---|
| 1. MEDICAL FACILITY (Emergency Care):<br>Mercy Medical Center<br>1111 6th Avenue<br>Des Moines, IA 50314              | (515) 247-3121 or 911                                   |
| 2. MEDICAL FACILITY (Non-Emergency Care):<br>Concentra Medical Center<br>2100 Dixon Street, Suite E<br>Des Moines, IA | (515) 265-1010  |
| 3. FIRE DEPARTMENT:<br>Des Moines Fire Department No. 10  | (515) 248-6010 or 911<br>(515) 283-4550 (non emergency) |
| 4. POLICE DEPARTMENT:<br>Des Moines Police Department   | (515) 283-4811 (non-emergency)<br>or 911                |
| 5. POISON CONTROL CENTER:   | (800) 222-1222  |
| 6. USACE MM DC PROJECT MANAGER:<br>John Miller  | (402) 995-2735 (office)<br>(402) 350-3735 (cell)        |
| 7. USACE DISTRICT PROJECT MANAGER:<br>John Miller   | (402) 995-2735 (office)<br>(402) 350-3735 (cell)        |
| 8. USACE OE SAFETY:<br>JJ Mars  | (402) 995-2287 (office)<br>(402) 740-4979 (cell)        |
| 9. SHAW PROJECT MANAGER:<br>Peter Kelsall   | (720) 554-8178 (office)<br>(303) 981-8435 (cell)        |
| 10. SHAW TECHNICAL LEAD:<br>Greg Sisco  | (865) 692-3568 (office)<br>(865) 414-4343 (cell)        |
| 11. SHAW FIELD LEADER:<br>Cindy Burns   | (720) 554-8265 (office)<br>(720) 984-6117 (cell)        |
| 12. SHAW OE SAFETY:<br>Brian Hamilton   | (303) 690-3116 (office)<br>(303) 809-0416 (cell)        |
| 13. SHAW UXO TECHNICIAN:<br>To be Determined<br>Contact: Al Grant   | (253) 517-5350 (office)<br>(831) 277-4241 (cell)        |
| 14. SHAW HOTLINE/HELPDESK:  | (866) 299-3445  |
| 15. SHAW HEALTH AND SAFETY MANAGER:<br>David Mummert, CIH   | (419) 425-6129 (office)<br>(419) 348-1544 (cell)        |
| 16. CORE HEALTH NETWORKS:   | (877) 347-7429 (EHS-Shaw)                               |

(3) EMERGENCY SIGNALS: In the case of small groups, a verbal signal for emergencies shall suffice. The emergency signal for large groups should be incorporated at the discretion of the UXO technician.

☒ Verbal      ☐ Nonverbal (Specify)

## VII. INCIDENT REPORTING

(1) ACCIDENTS: Safety-related incidents and accidents will be immediately reported to the Shaw Project Manager, Shaw Health and Safety Manager, Shaw Hotline/Helpdesk, and the

USACE Military Munitions Design Center (MM DC) Project Manager. Additional notifications within the USACE organization will be coordinated by the USACE MM DC Project Manager. Additional accident reporting responsibilities of Shaw personnel are described in Section 1.9 of the Accident Prevention Plan.

A copy of the Shaw Incident Notification, Reporting, and Management Procedure will be on site with the field team.

In the event of a life-threatening injury, call 911 to contact local emergency medical services.

## (2) DIRECTIONS TO THE NEAREST HOSPITAL/MEDICAL FACILITY:

### **Mercy Medical Center**

1111 6th Avenue

Des Moines, IA 50314

Phone Number: (515) 247-3121 or 911

Driving Distance: ~5.9 miles

Driving Time: ~17 minutes

### **Directions to Mercy Medical Center from Fort Des Moines Park (see Figure 1):**







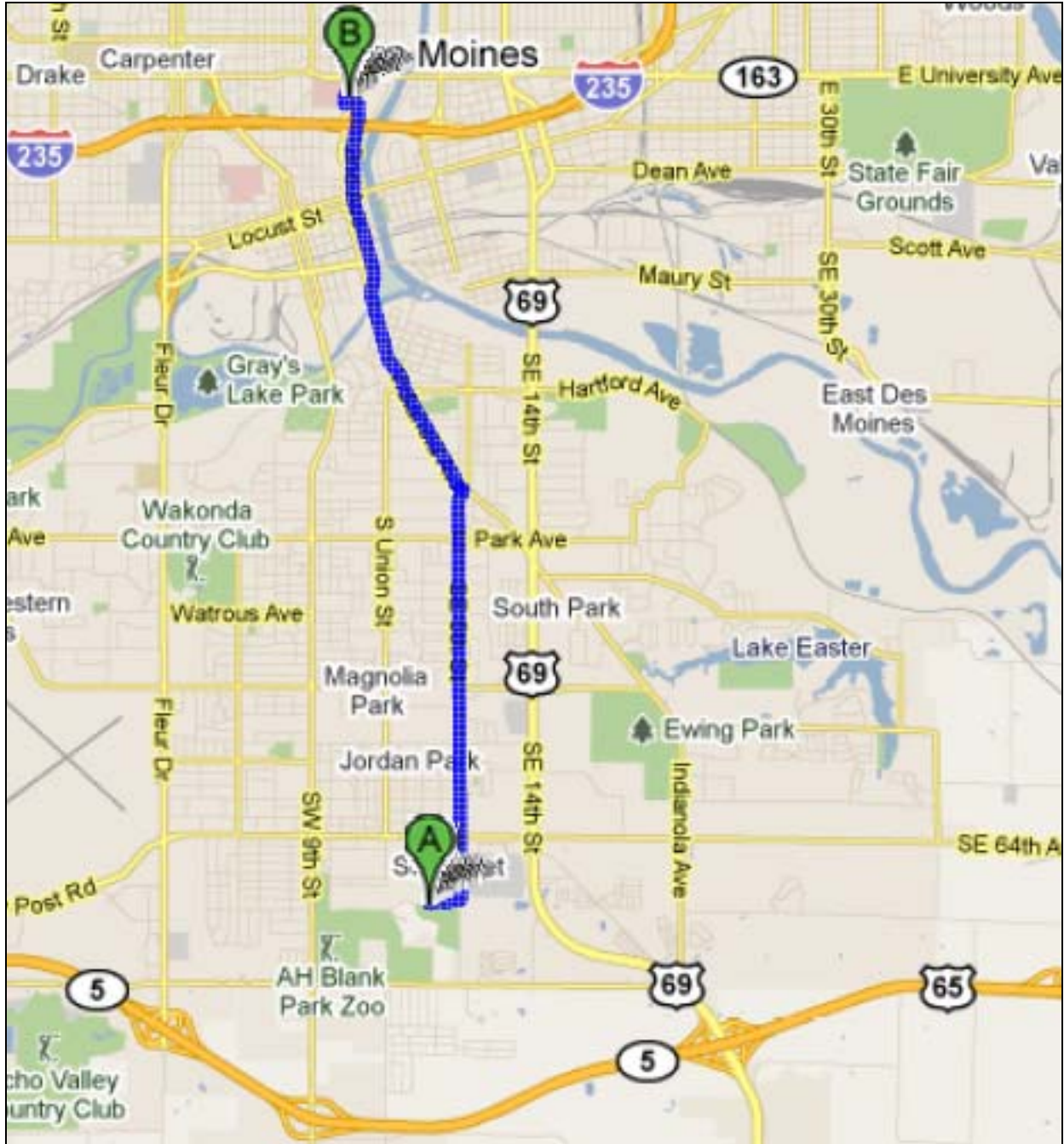
|   |  |                           |
|---|--|---------------------------|
|  <b>County Park</b>   |  |                           |
| 1. Head <b>east</b> on <b>County Park</b> toward <b>SE 5th St</b>   |  | go 0.2 mi<br>total 0.2 mi |
|  2. Turn left at <b>SE 5th St</b><br>About 7 mins                                      |  | go 2.8 mi<br>total 3.0 mi |
|  3. Turn left at <b>Indianola Ave</b><br>About 3 mins                                  |  | go 1.0 mi<br>total 4.0 mi |
| 4. Continue onto <b>SW 2nd St</b><br>About 5 mins   |  | go 1.8 mi<br>total 5.8 mi |
|  5. Slight left at <b>Americana Ct/Laurel St</b><br>About 1 min                        |  | go 0.1 mi<br>total 5.9 mi |
|  6. Take the 2nd right onto <b>3rd St</b><br>Destination will be on the left           |  | go 318 ft<br>total 5.9 mi |
|  <b>Mercy Medical Center</b><br>1111 6th Avenue, Des Moines, IA 50314 - (515) 247-3121 |  |                           |

Figure 1: Map to Mercy Medical Center from Fort Des Moines Park



### (3) CLINIC FOR NON-EMERGENCY MEDICAL TREATMENT

In the event of a work-related, non-life threatening injury, the following occupational health clinic is approved by CORE Health Networks for medical treatment of Shaw employees. Notifications per Section VII. (1), above, and to CORE Health Networks (877-347-7429) are required prior to transporting the employee to the clinic.

#### **Concentra Medical Center**

2100 Dixon Street, Suite E











Des Moines, IA

Phone Number: (515) 265-1010

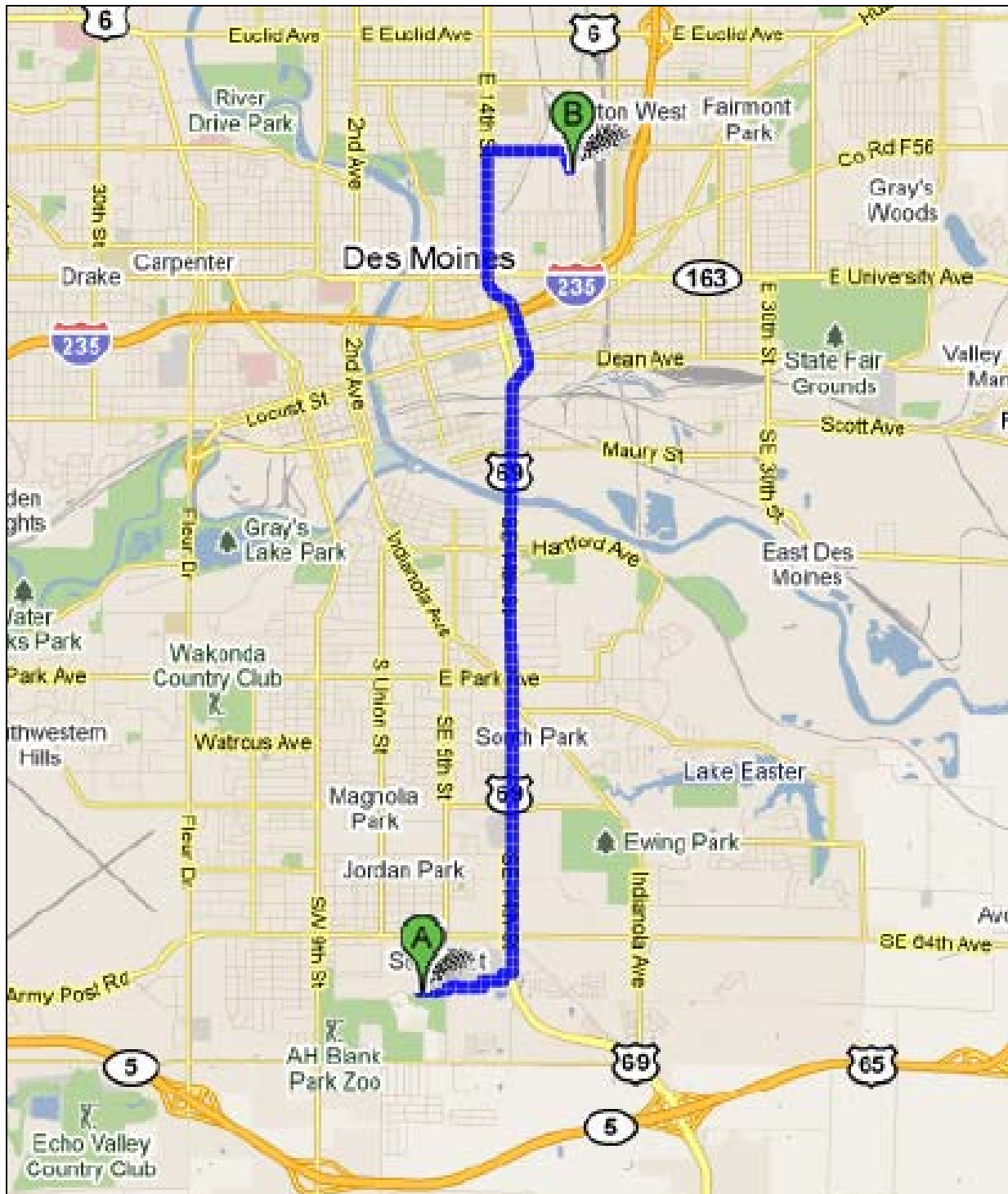
Driving Distance: ~8.2 miles

Driving Time: ~14 minutes

#### **Directions to Concentra Medical Center from Fort Des Moines Park (see Figure 2):**

|  |  |                           |
|--|--|---------------------------|
|  County Park  |  |                           |
| 1. Head east on County Park toward SE 5th St   |  | go 0.2 mi<br>total 0.2 mi |
|  2. Turn left at SE 5th St  |  | go 259 ft<br>total 0.3 mi |
|  3. Take the 1st right toward Southridge Mall                    |  | go 194 ft<br>total 0.3 mi |
|  4. Turn right at Southridge Mall<br>About 1 min                |  | go 0.5 mi<br>total 0.8 mi |
|  5. Turn left to stay on Southridge Mall                        |  | go 210 ft<br>total 0.8 mi |
|  6. Take the 1st right to stay on Southridge Mall               |  | go 381 ft<br>total 0.9 mi |
|  7. Turn left at SE 14th St<br>About 5 mins                     |  | go 4.8 mi<br>total 5.7 mi |
| 8. Continue onto E 15th St<br>About 2 mins   |  | go 0.5 mi<br>total 6.1 mi |
| 9. Continue onto Johnson Ct<br>About 2 mins  |  | go 0.4 mi<br>total 6.5 mi |
| 10. Continue onto E 14th St<br>About 1 min   |  | go 0.9 mi<br>total 7.5 mi |
|  11. Turn right at Guthrie Ave<br>About 1 min                   |  | go 0.6 mi<br>total 8.1 mi |
|  12. Turn right at Dixon St<br>Destination will be on the right |  | go 0.1 mi<br>total 8.2 mi |
|  2100 Dixon St, Des Moines, IA 50316                            |  |                           |

**Figure 2: Map to Concentra Medical Center from Fort Des Moines Park**



## **VIII. PERSONAL PROTECTIVE EQUIPMENT**

For field work to be performed at this site, Level D personal protective equipment (PPE) is required. Level D PPE requirements are defined in Section 5.1.5 of the SSHP (Shaw, 2006). In general, the use of hard hats is required on all USACE work sites, except on MEC-contaminated sites. At this FUDS, hard hats will only be worn if an overhead hazard is identified. If hard hats are worn, they will be securely fastened to the wearers head. Latex sample gloves will be worn during sample collection activities. Tyvek<sup>®</sup> coveralls may be worn to prevent incidental contact with the soil material if necessary. Tyvek<sup>®</sup> coveralls and gloves will be worn if poisonous plants, ticks, or other biological hazards are observed in the work area.

Contingency: If a higher level of protection is needed, then stop work, reevaluate safety equipment, and implement. Consult with the Project Health and Safety Manager if needed.

## **IX. DECONTAMINATION PROCEDURES**

Decontamination procedures are not anticipated as Level D PPE is being used. If decontamination is deemed necessary, procedures defined in Section 7.0 of the SSHP in the Work Plan will be followed. Team members are cautioned not to walk, kneel, or sit on any surface with potential leaks, spills, or contamination. PPE worn during field activities (e.g., Tyvek<sup>®</sup> coveralls or latex gloves) will be removed and bagged for disposal once sampling activities are completed.

## **X. TRAINING**

All site personnel and visitors will have completed the minimum training required by EM 385-1-1 (USACE, 2008a), 29 Code of Federal Regulations 1910.120(e), and DDESB TP18 (DoD Explosives Safety Board, 2004). The Shaw Field Team Leader will verify that all on-site personnel and visitors have completed the appropriate training prior to admitting the individuals on site. Additionally, the UXO technician assigned to this field reconnaissance will inform personnel before entering, of any potential site specific hazards and MEC safety procedures.

## **XI. GENERAL**

The number of persons visiting the site will be held to a minimum. The UXO technician can supervise no more than six non-UXO qualified persons while on MEC sites performing intrusive or non-intrusive work per EM 385-1-97 (USACE, 2008b). The Field Team Leader (with concurrence from the Health and Safety Manager) may modify this SSHP Addendum if site conditions warrant. All changes to the SSHP require USACE review and concurrence before new procedures can be applied in the field.

## **XII. SEVERE WEATHER CONTINGENCY PLAN**

Personnel should be aware of the possibility for the occurrence of severe weather. Severe weather may include:

- Tornadoes;
- Thunderstorms (lightning, rain, hail, flash flooding);

- High winds; and
- Blizzards.

The Field Team Leader, SSHO, or designee will listen to a weather forecast and watch the Weather Channel or local news program before going to the field. Based on the forecast, field activities could be delayed or suspended early. Additionally, field personnel should be aware of/informed of daily weather forecasts. Local weather broadcasts and information from a severe weather alert radio will be monitored by the Field Team Leader, SSHO, or designee when the likelihood for severe weather exists. The National Weather Service (<http://www.nws.noaa.gov>) should be consulted frequently. Weather conditions will be monitored throughout the day by all field team members.

Generally, cellular telephone communication will be used to alert crews to threatening weather. Necessary precautions or response, directed by the SSHO, will be taken in the event of severe weather. The Field Team Leader will decide what operations, if any, are safe to perform based on existing conditions and anticipated conditions.

The best protection against most severe weather episodes is to avoid them. This means seeking shelter before the storm hits.

## **TORNADO SAFETY**

The Field Team Leader, SSHO, or designee will identify the nearest tornado shelter prior to beginning site operations. The location and route will be discussed in the initial safety briefing, repeated at least once a week and discussed when new personnel arrive onsite.

When a tornado has been sighted, go to the identified tornado shelter immediately. If in a trailer or vehicle, get out immediately and go to a tornado shelter immediately. Do not attempt to out-drive a tornado since they are erratic and move swiftly.

In the event you do not have time to go to the identified tornado shelter, personnel should take cover in a basement or interior room of a strong building, ditch or culvert. If you take cover in a building:

- Go to the basement or storm cellar. If there is no basement, go to an interior room on the lower level (bathrooms, closets, interior hallways); interior hallways on the lowest floor are usually safest.
- Get under a piece of sturdy furniture such as a workbench or heavy table or desk and hold on to it.
- Use arms to protect head and neck.
- Stay away from windows, doors, and outside walls.

If you take cover in a ditch or culvert:

- Lie and shield your head with your hands.
- If in a car, get out and take shelter in a nearby building.

- Be aware that ditches and culverts may fill up with water quickly and use these as shelters as a last resort.

## **LIGHTNING SAFETY**

When clouds with dark bases and wind speeds pick up, anticipate thunderstorms and lightning. Those who have been struck by lightning generally did not seek cover in a timely fashion.

The "flash/bang" (f/b) technique of measuring the distance to lightning will be reviewed with all personnel. The f/b technique is defined as: for each 5 seconds from the time of observing the lightning flash to hearing the associated thunder, the lightning is 1 mile away. All outside activities will be suspended when a lightning flash is immediately in the area or the f/b measuring 30 seconds (6 miles away) is noted. Personnel will gather in the safe area for a head count and further instructions.

Safe areas include:

- Fully enclosed metal-topped vehicles with windows up.
- Substantial and permanent buildings.

Unsafe areas include:

- Small structures including huts and rain shelters.
- Nearby metallic objects like fences, gates, instrumentation and electrical equipment, wires, and power poles.

The following shall also be avoided when lightning is in the area:

- Tall isolated objects (for example trees),
- High ground,
- Open fields,
- Water,
- Using hard-wired telephones and headsets, and
- Heavy equipment.

If hopelessly isolated from shelter during close-in lightning, adopt a low crouching position with feet together (up on toes, if possible) and hands on ears. If hair stands on end or rises on back of neck, a lightning strike is imminent.

Remember the warning phrase from the National Lightning Safety Institute: "If you can see it (lightning), flee it; if you can hear it (thunder), clear it."

People who have been struck by lightning do not carry an electrical charge and are safe to handle. Apply first aid immediately, if you are qualified to do so. Get emergency help promptly.

Outdoor activities may resume when 30 minutes has elapsed since the last observable f/b equaled 30 seconds or greater.

### **XIII. HEAT STRESS AWARENESS**

The SI field activities will be conducted in the summer months and hot and humid weather conditions will possibly be encountered. Daily weather forecasts will be provided to all the field team members and discussed at the Daily Health and Safety Tailgate Meeting to ensure appropriate clothing is being worn. Additionally, weather conditions will be monitored throughout the day by all field team members.

The combination of warm ambient temperature, humidity and protective clothing increases the potential for heat stress. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and individual characteristics. Extremely hot weather can cause physical discomfort, loss of efficacy, or personal injury. Individuals vary in their susceptibility to heat stress.

Heat stress disorders include rash, cramps, exhaustion, and stroke. Heat stress awareness training will be a part of the initial training session and will be reinforced, as necessary, during daily tailgate safety meetings. Heat stress prevention is outlined in procedure HS400 of the Shaw Corporation Health and Safety Procedures Manual. This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages; e.g., Gatorade<sup>®</sup>. Water will be provided on-site.

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur, ranging from mild to fatal. Heat-related problems include:

***Heat Rash*** - Caused by continuous exposure to heat and humidity and is aggravated by chafing clothes. Heat rash decreases the body's ability to tolerate heat as well as being a nuisance.

***Heat Cramps*** - Caused by profuse perspiration with inadequate electrolytic fluid replacement. Heat cramps cause painful muscle spasms and pain in the extremities and abdomen.

***Heat Exhaustion*** - Caused by increased stress on various organs to meet increased demand to cool the body. Heat exhaustion causes shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness. Promptly moving the affected individual to a cool place to lie down and providing cool fluids to drink can alleviate heat exhaustion.

***Heat Stroke*** - The most severe form of heat stress. This is a life-threatening situation. Call EMS. Heat stroke symptoms include hot, dry skin; no perspiration; nausea; dizziness; confusion; strong, rapid pulse; and coma. The body must be cooled immediately to prevent severe injury or death. Remove the victim from heat. Immerse victim in cool bath or wet clothing to allow better evaporative cooling.

The following practices may help reduce the probability of succumbing to heat stress:

- Acclimate workers to heat conditions when field operations are conducted during hot weather.

- Provide plenty of liquids to replace the body fluids lost by perspiration. Fluid intake must be forced because, under conditions of heat stress, the normal thirst mechanism is not adequate to bring about a voluntary replacement of lost fluids.
- Train personnel to recognize the signs and symptoms of heat stress and its treatment.
- Rotate personnel to various job duties, if possible.
- Encourage workers to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the SSHO and Field Team Leader.

Individuals succumbing to the symptoms of heat stress will notify the Field Team Leader. In the event of heat stress, halt activities and initiate treatment. Early detection and treatment of heat stress can prevent the onset of more serious heat stroke or exhaustion conditions. Individuals that have succumbed to any heat-related illness become more sensitive and predisposed to additional heat stress situations.

**Notify Team Leader** if you have a condition such as cardiac (heart) disease that may affect your ability to tolerate heat, or if you are taking medications such as beta-andrenergic receptor blockers and calcium-channel blockers, diuretics, antihistamines, phenothiazines, or cyclic antidepressants. If you are not sure if your prescription medication is one of those, please contact your doctor or pharmacist.

For additional information regarding heat stress, refer to Section 4.2.2 of the approved Accident Prevention Plan and Site Safety and Health Plan included in the Work Plan (Shaw, 2006).

#### **XIV. TICK AVOIDANCE**

Personnel conducting investigations in rural or wooded areas have the potential to come in contact with ticks. Ticks find a host by seeking out carbon dioxide that is put out through the skin. For the SI field team operating in rural areas, it may be impossible to completely prevent contact with ticks. However, there are several precautions which can lower the risk of being bitten:

- When walking through wooded areas or areas with grass do not sit on the ground. If possible, sit on rocks.
- Insect repellent containing at least 30 percent Deet can be effective in masking the carbon dioxide excretion.
- Wear light-colored clothing when possible as ticks are dark and more easily seen on light colored clothing.
- Tuck the bottom of pants into socks or boots.
- If ticks are observed in the area, then Tyvek® coveralls are to be worn as described in Section VIII.
- Always check your entire body for ticks, including your hair. Use a fine-tooth comb.
- Leave wildlife alone as they may carry ticks.

- Keep hands and feet out of areas you can't see. Don't pick up rocks or other ground items if it can be avoided.

How to remove a tick:

- Grasp the tick with tweezers and slowly pull on the tick, at a 90 degree angle. As you pull, the tick will release from the skin.
- Do not use fire or a hot match to remove a tick.

Wash the bite with soap and water if possible.

## SAFETY BRIEFING CHECKLIST

|   |                     |
|---|---------------------|
| SITE NAME: Fort Des Moines Pistol Range MRS<br>Fort Des Moines Park, Des Moines, Iowa | DATE/TIME:        / |
|---|---------------------|

### GENERAL INFORMATION

(Check subjects discussed)

- ☐ PURPOSE OF VISIT
- ☐ IDENTIFY KEY SITE PERSONNEL
- ☐ TRAINING AND MEDICAL REQUIREMENTS

### SPECIFIC INFORMATION

- ☐ SITE DESCRIPTION/PAST USES
- ☐ RESULTS OF PREVIOUS STUDIES
- ☐ POTENTIAL SITE HAZARDS
- ☐ MEC SAFETY PROCEDURES
- ☐ SITE SOPs
- ☐ SITE CONTROL AND COMMUNICATIONS
- ☐ EMERGENCY RESPONSE
  - ☐ LOCATION OF FIRST AID KIT
  - ☐ EMERGENCY PHONE NUMBERS AND LOCATION
  - ☐ LOCATION AND MAP TO NEAREST MEDICAL FACILITY
  - ☐ PPE AND DECONTAMINATION

Stress the following during the briefing: If hazardous conditions arise, stop work, evacuate the area, and notify the SSHO and Shaw PM immediately.

**PLAN ACCEPTANCE FORM**  
**SITE SAFETY AND HEALTH PLAN ADDENDUM**  
**FOR**

---

**Site Name: Fort Des Moines Pistol Range MRS**

**Location: Fort Des Moines Park, Des Moines, Iowa**

I have read and agree to abide by the contents of the Site Safety and Health Plan and this Addendum and I have attended the Safety Briefing for the aforementioned site.

| NAME (PRINTED) | OFFICE | SIGNATURE | DATE |
|----------------|--------|-----------|------|
|                |        |           |      |
|                |        |           |      |
|                |        |           |      |
|                |        |           |      |
|                |        |           |      |
|                |        |           |      |
|                |        |           |      |
|                |        |           |      |

Person presenting the safety briefing:

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
DATE

***Appendix D***  
***Standard Operating Procedures***

---

# STANDARD OPERATING PROCEDURE

**Subject: Trowel/Spoon Surface Soil Sampling**

---

## 1. PURPOSE

The purpose of this document is to provide the methods and procedure for sampling of surface soils using trowels or spoons. Trowels or spoons can be used when matrices are composed of relatively soft and non-cemented formations and to depths of up to 12 inches into the ground surface, dependent on site conditions. Samples for Volatile Organic Compound (VOC) analysis should not be collected via trowel or spoon method. However, a trowel or spoon may be utilized to penetrate to and expose the undisturbed material at the desired depth for sampling by more applicable methods.

## 2. SCOPE

This procedure is applicable to all Shaw E & I projects where surface soil samples will be collected via trowel or spoon methods.

## 3. REFERENCES

- U.S. Army Corps of Engineers, 2001, *Requirements for the Preparation of Sampling and Analysis Plans*, Appendix C, Section C.6, EM200-1-3, Washington, D.C.

## 4. DEFINITIONS

- **Trowel**—A sample collection device with a curved and pointed metal blade attached to a handle. All trace environmental samples should be collected using stainless steel blades.
- **Spoon**—A sample collection device with a round metal blade attached to a handle.
- **Surface Soil**—Soil that is removed from the surface no greater than 6 inches below grade after removing vegetation, rocks, twigs, etc.
- **Weathered Soil**—The top 1/8 to 1/4 inch of soil impacted by heat from sun, rain, or foot traffic that could evaporate, dilute, or otherwise deposit contaminants from an adjacent location, thereby misrepresenting the actual soil characteristic.

## 5. RESPONSIBILITIES

### 5.1 Procedure Responsibility

The Field Sampling Discipline Lead is responsible for the maintenance, management, and revision of this procedure. Questions, comments, or suggestions regarding this technical SOP should be directed to the Field Sampling Discipline Lead.

### 5.2 Project Responsibility

Shaw employees performing this task, or any portion thereof, are responsible for meeting the requirements of this procedure. Shaw employees conducting technical review of task performance are also responsible for following appropriate portions of this SOP.

For those projects where the activities of this SOP are conducted, the Project Manager, or designee, is responsible for ensuring that those activities are conducted in accordance with this and other appropriate procedures. Project participants are responsible for documenting information in sufficient detail to provide objective documentation (checkprints, calculations, reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

## **6. PROCEDURE**

### **6.1 Equipment**

- Decontaminated trowel or spoon, stainless steel construction for trace environmental sampling. If samples will be collected at depth (0-6 inches), the trowel or spoon will require decontamination prior to collection of the targeted-depth sample. Alternatively, a different trowel or spoon can be used to remove the material to the targeted depth and the sample collected using a clean dedicated trowel or spoon.
- Engineers rule or stiff measuring tape
- Decontaminated stainless steel mixing bowl

### **6.2 Sampling**

1. Don a pair of clean gloves.
2. If desired, place plastic sheeting around the targeted location to keep sampled material in place. Use a knife to cut an access hole for the sample location.
3. Remove any surficial debris (e.g. vegetation, rocks, twigs) from the sample location and surrounding area until the soil is exposed. Once exposed, the soil surface is designated as "at grade," or 0 inches.
4. Use a trowel to scrape and remove the top 1/8 to 1/4 inch of weathered soil. (A spoon can be interchanged with trowel).
5. If collecting a sample that includes VOC analysis, collect the VOC sample aliquot first following more applicable methods.
6. With a new trowel, place the point of the blade on the ground. While holding the handle of the trowel, partially rotate the blade in a clockwise/counter-clockwise motion while pushing at a downward angle until the blade is inserted to the required depth or the blade is nearly covered. Be certain that the trowel is not inserted to a depth where the soil will touch the handle or other non-stainless steel portion of the trowel or the sampler's hand.
7. With a prying motion lift up the trowel with soil on the blade and place soil into the stainless steel mixing bowl.
8. Repeat steps 6 and 7 until the required depth of soil is placed into the mixing bowl.
9. Measure the depth of the sample location with a rule or tape to verify the sampling depth and record in the field logbook.
10. Homogenize the non-VOC sample and transfer the sample directly into the sample container(s). Cap the sample container(s), label the containers, complete the documentation, and place the containers into the sample cooler.

**7. ATTACHMENTS**

None.

**8. FORMS**

None.



reports, etc.) that the requirements of this SOP have been met. Such documentation shall be retained as project records.

## 6. PROCEDURE

**Safety Note:** Surface water sampling can sometimes require the use of boats for access into or across bodies of water. Observe all boating safety considerations in the HASP including donning of proper life jackets. If sampling from a bank, do not overreach; use a Pond Sampler whenever possible and do not attempt to remove the container from the clamp while still in contact or close proximity to the water body. Do not wade into a water body unless the depth is well known, currents are flowing at a safe speed, appropriate personnel have determined it is safe, and a spotter is available.

### 6.1 Direct Immersion

The following procedure shall be used for direct immersion sampling:

- Don a pair of clean gloves.
- Obtain the required sample container(s).
- If entering the water body, always do so with as little bottom disturbance as possible and wait for the water around the planned sampling area to return to its undisturbed state (clarity) before sampling.
- Collect each liquid sample by slowly submerging the sample container with minimal surface disturbance. If sampling in a stream or current, make sure the open end of the sample container is pointed upstream.
- Withdraw the container from the liquid with minimal disturbance; cap and wipe the outside of the container with a towel or cloth.
- If collecting samples for VOC analysis, make sure that the VOA vial is slightly overfilled before capping, and check for bubbles or trapped air by inverting. If the sample integrity is compromised, discard the sample and repeat the collection process.
- Complete all required documentation, and place the sample containers into a cooler or other specified container.

### 6.2 Pond Sampler

The following procedure shall be used for sampling with a pond sampler:

- Don a pair of clean gloves.
- Place plastic sheeting around the area where the sampler will be emptied.
- Assemble the pond sampler and secure the sample container or collection jar/bottle/beaker in the adjustable clamp.
- If entering the water body, always do so with as little bottom disturbance as possible and wait for the water around the planned sampling area to return to its undisturbed state (clarity) before sampling.
- Collect each liquid sample by extending the container end outward and slowly submerging the sample container while holding the Pond Sampler handle with minimal surface disturbance. If sampling in a stream or current, make sure the open end is pointed upstream.

- Retrieve the container with minimal surface disturbance, retract any extensions, transport the sample while still attached to the emptying area, and remove it from the clamp.
- Alternatively, if sampling with a partner, the partner can remove the collection container from the clamp and carry it to the transfer area.
- If the container is the one to be used for the sample, remove it from the clamp, cap, and label.
- If the sampler was used to collect a fill container, remove the lid(s) from the required sample containers and slowly transfer the sample into the appropriate containers; cap and label each one.
- Fill containers for VOC analysis first, making sure that the VOA vial is slightly overfilled before capping, and check for bubbles or trapped air by inverting. If the sample integrity is compromised, discard the sample and repeat the vial filling process.
- Complete all required documentation, and place the samples into a cooler or other specified container.
- After each use (i.e. between sample locations), the pond sampler must be disassembled and decontaminated, especially at the clamp area.

Sample jars or beakers are attached to the pole using the clamps for collecting the sample. With a pond sampler device, sample jars can be attached directly to the sample pole and the sample directly filled into the sample jar, or a sampling beaker can be attached to the pole and the collected sample then transferred to an appropriate sample jar. If sample jars are filled directly, they should be wiped clean prior to being placed in the cooler for shipment. If sampling beakers are used, they can be disposed of or decontaminated prior to reuse.

## 7. ATTACHMENTS

None.

## 8. FORMS

None.